# CYBER 960/962 Mainframe Complex

Installation and Checkout Guide

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features and parameters.

# Manual History

This manual is revision A, printed October 1988.

Revision	Change Order	Date	Reason for Change	
<b>A</b> ,	_	10-04-88	Manual released.	

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# Equipment Supported in This Manual

This manual supports the following equipment at the series levels listed, assuming all field change orders (FCOs) against the equipment have been installed. Compare the list of FCOs in this table with the list in your equipment FCO log. If the two lists match, this manual accurately reflects your equipment.

Equipment	Series	FCOs	Comments
AD121-A	01	-	Released.
AT478-B	01	-	Released.
AT481-A	01	-	Released.
AT511-A	01	-	Released.
AT512-A	01	-	Released.
CC598-A	01	-	Released.
CC598-B	01	-	Released.
GD311-A	01	-	Released.
GK434-A	01	-	Released.

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## **About This Manual**

This manual provides information for the installation and checkout of the CONTROL DATA® CYBER® 960 and 962 Mainframe Complexes.

#### Audience

The manual addresses customer engineers who are trained on the CYBER 960 and 962 mainframe complexes.

### Organization

The manual contains three chapters that include an introduction, installation, and checkout of the CYBER 960 and 962 mainframe complexes. The chapters contain step-by-step instructions, arranged in modules for a sequential order of installation and checkout.

Instructions in the manual begin with the time that follows equipment delivery, after its unpacking, removal from pallets (if present), and placement on the computer room floor. Unpacking instructions are on the exterior of the equipment shipping cointainers.

#### Conventions

New features, as well as changes, deletions, and additions to this manual, are indicated by vertical bars in the page margins.

### Radio Frequency Warning

# **AWARNING**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a class A computing device and peripheral computing devices pursuant to Subpart J of part 15 of the FCC Rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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### Disclaimer

The installation and checkout information is valid only as described in this manual and other referenced manuals and documents. Control Data cannot be responsible for problems that result from improper installation and checkout. If any information in this manual conflicts with local building, electrical, or fire codes or ordinances, the customer should consult with local authorities on these matters.

IT IS THE CUSTOMER'S RESPONSIBILITY TO ENSURE THAT APPLICABLE BUILDING, ELECTRICAL, AND FIRE CODES OR ORDINANCES ARE FOLLOWED.

#### Related Manuals

This manual and other related manuals are listed in the CYBER 960/962 Hardware Manuals set figure on the following page.

### Additional Related Manuals

Additional manuals, referenced in this manual but not in the CYBER 960/962 Hardware Manuals figure set, include:

Title	Publication Number
Remote Technical Assistance (RTA) Handbook	60000078
CYBER 96X MSL Test Procedures Reference Manual	60000292
MSL 15X Off-Line Maintenance Software Library Reference Manual	60456530
CYBER Initialization Package (CIP) Reference Manual	60457180
MSL 153/155 Maintenance Software Reference Manual Test Procedures	60461110
MSL 153/155 Maintenance Software Reference Manual Test Descriptions	60461920

#### CYBER 960/962 HARDWARE MANUALS

## SYSTEM MANUALS

#### **EQUIPMENT MANUALS**

#### Site Preparation

General Information Site Preparation

60275100

Mainframe Complex Data Site Preparation

60000119

Peripheral Equipment Data Site Preparation

60275300

#### Central Processing Unit (CPU)

CPU Hardware Maintenance

60000123

CPU Theory and Diagrams 60000118

#### Installation Mainframe F

Mainframe Complex Installation and Checkout

60000120

Mainframe Power and Environmental

Mainframe Power and Environmental Subsystems Hardware Maintenance 60000125

Mainframe Power and Environmental Subsystems Theory and Diagrams 60000121

#### Operation

Cyber 170 State Hardware Reference

60000127

Virtual State Hardware Reference Volume I

60000132

Virtual State Hardware Reference Volume II 60000133

#### Input/Output Unit (IOU)



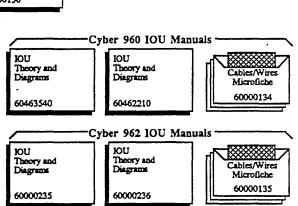
60000130



#### **Troubleshooting**

System Troubleshooting Guide

60000122



#### Codes

System Codes Booklet

60458100

Mainsenance Register Codes Booklet

60458110

#### Motor Generator and Control Cabinet (MG Sets)

25-kVA Frequency Converter Hardware Maintenance 60456520

40-kVA Control Cabinet and Motor Generator Hardware Maintenance 60454720 MG Interface Unit Hardware Maintenance

M02240

## **Submitting Comments**

Control Data welcomes your comments about this manual. Your comments may include your opinion of the usefulness of this manual, your suggestions for specific improvements, and the reporting of any errors you have found.

You can submit your comments on the comment sheet on the last page of this manual. If the manual has no comment sheet, mail your comments to:

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### Ordering Manuals

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The latest manual revision levels and ordering information are in the Literature and Distribution Services Catalog, publication number 90310500.

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This chapter contains a list of equipment in the mainframe complex and a list of tools used in its installation.

Call your CYBER Hardware Support (CHS) at any time for assistance in resolving any installation or checkout difficulties.

Revision A Introduction 1-1

## Equipment in the Mainframe Complex

Table 1-1 lists the mainframe complex equipment. Figure 1-1 shows the equipment, except for the modem and frequency converter or MG set.

Table 1-1. CYBER 960 and 962 Mainframe Complex Units

Unit	Quantity
Mainframe	
• Power Unit	1
<ul> <li>Central Processing Unit (CPU) which includes: CP-0, optional CP-1, CM, and CMC</li> </ul>	1
• Input/Output Unit (IOU)	1
Optional IOU Expansion	1
Optional Standalone IOU	1
Optional Standalone IOU Expansion	1
System Console	1
RTA Modem	1
MG Interface Unit	1
One of the following:	1
• 25-kVA, 50/60-Hz Frequency Converter or	
• 40-kVA, 50/60-Hz Motor-Generator (MG) Set	

#### NOTE

When the equipment includes options other than the physical units listed, the options are physically contained within the units when shipped to the site.

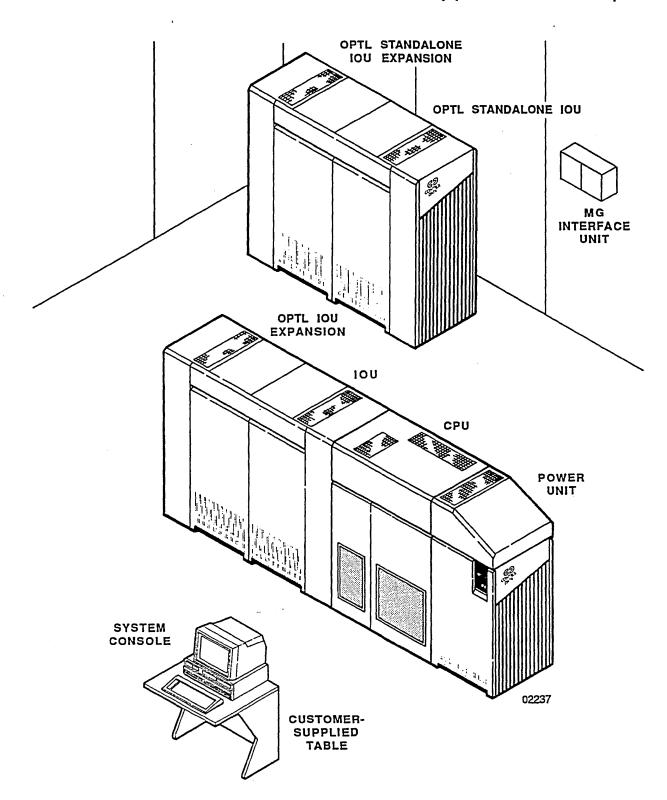


Figure 1-1. Mainframe Complex

Revision A Introduction 1-3

### Tools, Parts, and Materials

The following tools, parts, and materials are required for installation. The availability of these items is the responsibility of the equipment installers.

- Cable ties
- Cutter, diagonal
- Drive socket set, 1/4-in with 2-in extension
- Insertion tool, IOU pak
- Pak insertion tool for IOU modules
- Screwdriver, Phillips, medium
- Screwdriver, slotted, medium
- Smocks, antistatic, two minimum
- Tissues, absorbent
- Torx driver set
- Voltmeter, Fluke 77 Analog/Digital or equivalent
- Wand, insulated tuning
- Wrench, 10-in adjustable
- Wrench, ratchet and 1/2-in socket

The following tools, parts, and materials are required for installation. They are shipped in an installation kit with the power unit. The kit includes:

- Bolting hardware
- Cable, system console-to-power unit
- Cloth, cleaning
- Copper finger replacement sections
- Gauge, pin alignment
- Gloves, heavy duty
- Gloves, protective stretch
- Grease, electrical
- Pad, cleaning
- Quick Release
- Screwdriver, slotted, 100 mm (4 in) maximum length shaft
- Spacer plate, 1/4-in (four per IOU)
- Straightener, pin
- Wrench, Allen, 5/16-in (two)
- Wrench, torque and 1/2-in deep socket
- Wrist straps, antistatic, and ground wires

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	Connect Power Unit Cables to CPU			
	Connect CP-0 and CP-1 Cables to IOU			
	Connect Optional IOU Expansion Cables to IOU			
-	Connect Optional Standalone IOU Cables to CPU			
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	Adjust IOU Voltages			
	Adjust Two-Port Multiplexer Power Supply			
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The following major tasks outline the installation process for the CYBER 960 and 962 mainframes. These tasks require a minimum of two installers and consist of individual procedures, listed in sequential order. In some unique installations the order of these procedures may require some change. In such instances, the installers must have a thorough familiarization with the procedures and the effect of the changes on the overall installation.

The installation process includes:

- Removing Shipping Materials
- Placing and Bolting Units
- Connecting Cables
- Checking Prepower Conditions
- Connecting Site Power Wiring
- Applying Initial Power
- Checking IOU Scanning Functions
- Checking EMI Seals
- Installing System Console Cabling

Should any problems arise during the installation that cause excessive delays and are not readily resolvable through normal installation practices or through the use of maintenance manuals listed in the front of this manual, call your CYBER Hardware Support (CHS).

Revision A Installation 2-1

# **▲**CAUTION

The equipment installed in the following procedures may be damaged by electrostatic discharges. Installers must:

- Wear antistatic smocks during the entire installation.
- Wear an antistatic wrist strap that connects by wire to a frame ground any time when working on the mainframe with the doors opened.
- Install unit doors or panels as follows:
  - 1. Wear antistatic smock and wrist strap.
  - 2. Move door or panel near to installation location.
  - 3. Hold door or panel with one hand and connect ground wire from wrist strap to equipment frame ground with other hand.
  - 4. Install door or panel on equipment.

# Removing Shipping Materials

The following procedures describe the removal of shipping materials from the power unit and CPU blowers.

- Remove Shipping Material from Power Unit Blower
- Remove Shipping Material from CPU Blowers

Revision A Installation 2-3

#### Remove Shipping Material from Power Unit Blower

Use this procedure to remove shipping material from under the power unit blower. 1. Check that unpackaging of equipment is complete. NOTE Go to step 7 if power unit muffler (figure 2-1) was shipped disassembled from the power unit. 2. Turn muffler cam latch at rear of power unit fully ccw, using supplied 5/16-in Allen wrench. 3. Turn power unit front door cam latch fully ccw with Allen wrench and open 4. Unscrew captive screws on system status and main control panels. Open panels. \_\_ 5. Reach in panel openings and slide retaining clips back from muffler guide pins. **▲WARNING** The weight of the power unit muffler requires a minimum of two installers to safely lift it off the unit. Avoid touching sharp edges on the blower when removing shipping materials under the blower. 6. Lift muffler up and off of power unit. 7. Put on heavy duty gloves for removal of shipping material from blower. 8. Stand on a support, if necessary, that allows you to safely reach in from top of power unit and remove shipping material from under blower. \_\_\_ 9. Set muffler on top of power unit. Guide pins must go into guide pin holes. \_\_\_ 10. Slide retaining clips into guide pins. \_\_\_\_11. Turn muffler cam latch at rear of power unit fully cw. \_\_\_\_12. Check that muffler is securely fastened at front and back of unit. \_\_\_13. Close and secure system status and main control panels with captive screws. Be sure to keep cables clear of door hinges and closing areas to prevent cables from being pinched. \_\_\_\_14. Close and latch front power unit door.

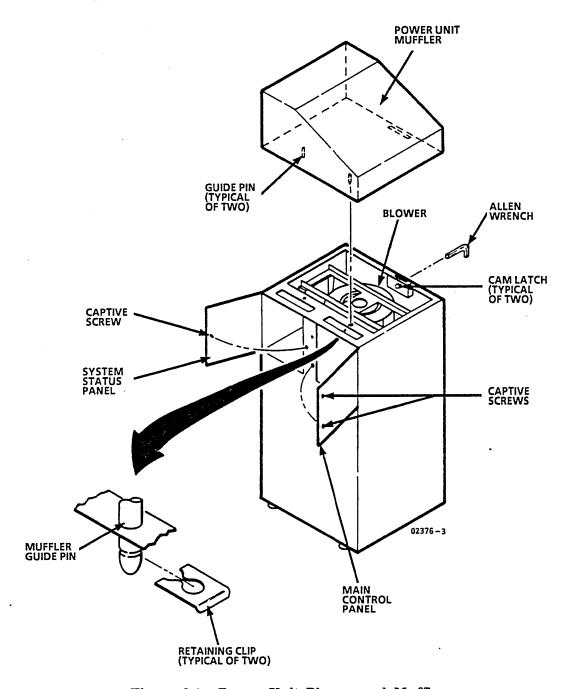


Figure 2-1. Power Unit Blower and Muffler

Revision A Installation 2-5

9. Turn two muffler cam latches at front and two at rear of CPU fully cw.

\_\_\_\_ 10. Check that muffler is securely fastened at front and back of unit.

\_\_\_ 11. Close and latch CPU doors.

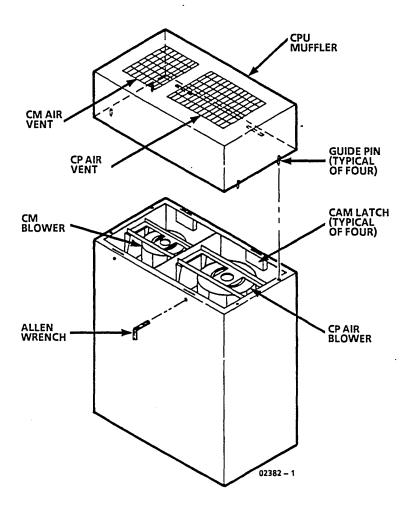


Figure 2-2. CPU Blowers and Muffler

Revision A Installation 2-7

Fo present	the :	information	in th	is chapter	r in a	structured	format,	this pa	ge has b	een

Removing Shipping Materials

## Placing and Bolting Units

The following procedures describe the placing of the mainframe units at predetermined floor positions, greasing power-bus connections, bolting the units together, and installing trim panels.

- Check Floor Cutouts
- Preplace Power Unit
- Place CPU
- Prepare Power Bus Plates
- Place and Bolt Power Unit
- Connect Power Bus Plates
- Align Power Unit
- Place and Bolt IOU
- Place and Bolt Optional IOU Expansion
- Place Optional Standalone IOU
- Place and Bolt Optional Standalone IOU Expansion
- Install IOU Trim Panels

Revision A Installation 2-9

#### **Check Floor Cutouts**

Use this procedure to check previously cut floor panels for the computer room, as defined in the Mainframe Complex Data Site Preparation manual. Use the procedure to also place the floor cutout panel for the power unit. Place the remaining floor cutout panels as they are needed during the installation.

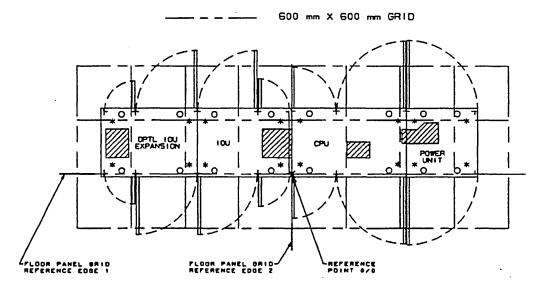
 1. Compare	floor cutout	panels to fig	gure 2-3 to	ensure that a	ill panels are	present
and to id	lentify their	locations wit	h floor refe	rence point 0	<b>/</b> 0.	

2. Place only power unit floor cutout panel in floor, if not previously place	reviously placed.	t previousl	. if not	floor.	in	panel	cutout	floor	unit	power	only	Place	2.
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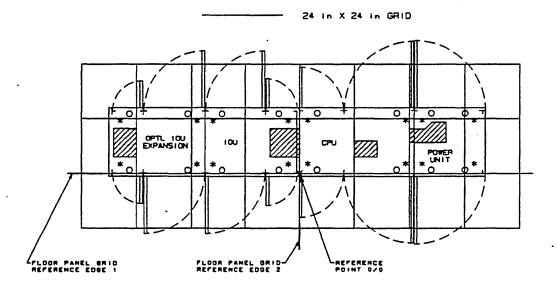
# **AWARNING**

Unused floor cutout panels must be replaced with uncut panels until needed to avoid hazardous conditions to installers and equipment being moved.

- 3. Remove other floor cutout panels, if in place, and temporarily replace them with uncut panels. Later procedures state when to place the remaining cutout panels.
- 4. Be sure that uncut floor panels under the equipment are full-strength, without air holes.



FRONT



FRONT

NOTE

FLOOR PLACEMENT OF THE OPTIONAL STANDALONE IOU AND STANDALONE IOU EXPANSION (NOT SHOWN) ARE THE SAME AS FOR THE IOU AND OPTIONAL IOU EXPANSION, AS REFERENCED FROM SIMILAR REFERENCE DRIDG 1 AND 2 THAT ESTABLISH A REFERENCE POINT 0/0 FOR THE STANDALONE UNITS.

60000120-01

Figure 2-3. Floor Cutout Panels

Prep	lace	Power	Uni	t
------	------	-------	-----	---

Use	Use this procedure to initially position the power unit.						
	1. Be sure that:						
	a. Blower mufflers are installed on CPU and power unit.						
	b. Floor cutout panel for power unit is in place.						
	•						
	<b>AWARNING</b>						
	Use care when moving power unit to prevent a caster from rolling into floor cutout and tipping, possibly overturning, the unit.						
	2. Move power unit to approximate location as shown in figure 2-4.						
	3. Place power cords into floor cutout. (Power cords are not used at sites that use direct-power-wiring connections. A later procedure describes the power-cord and direct-wiring connections.)						

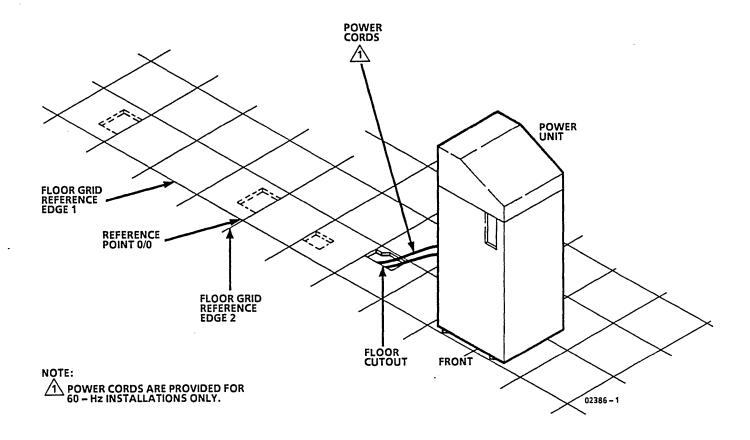


Figure 2-4. Power Unit Initial Placement

Installation 2-13

 4. Turn front and rear door cam latches fully ccw, using supplied 5/16-in Allen wrench, and open doors.
 5. Remove front and rear doors (figure 2-5) after unscrewing one end of strain refief and removing two push-to-release pins from hinges on each door. Store pins in door hinges.
 6. Release quarter-turn fasteners on front and rear airflow control panels and remove panels.
 7. Remove power-unit-to-system-console cable, stored in lower part of power unit. This is a 15.2-m (50-ft) cable, installed in a later procedure.

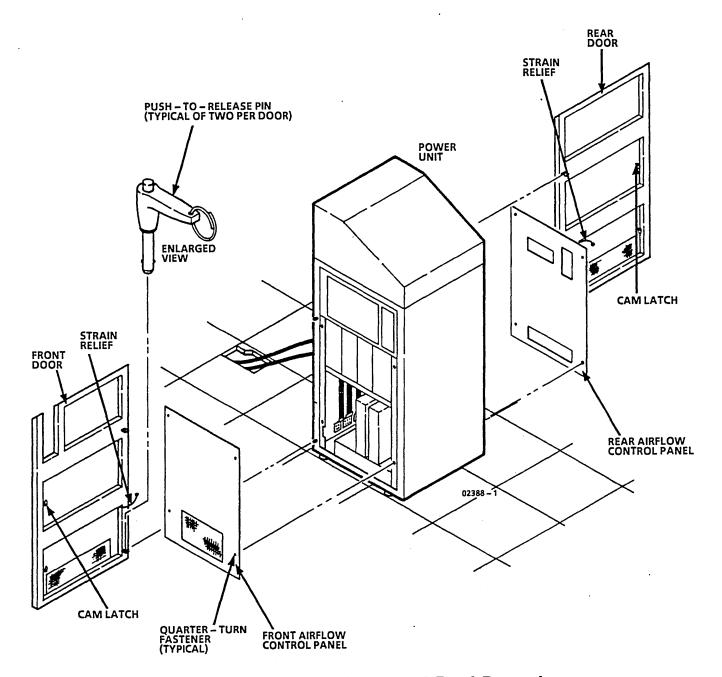


Figure 2-5. Power Unit Door and Panel Removal

Installation 2-15

## Place CPU

Use this procedure to position the CPU and lower its leveling pads.

Pro	cedure
	1. Be sure that:
	a. Previous procedure is completed.
	b. Site preparations have identified CPU floor reference point 0/0 (figure 2-6).
	2. Place CPU floor cutout panel in floor.
	<b>AWARNING</b>
	Use care when moving CPU to prevent a caster from rolling into floor cutout and tipping, possibly overturning, the unit.
	3. Move CPU to its location over floor cutout so that:
	a. Open CPU doors to observe frame, relative to floor grid.
	b. Left front corner of frame is at reference point 0/0, intersection of floor grid reference edges 1 and 2.
	c. Front of frame is in line with floor grid reference edge 1.
	d. Left end of frame is in line with floor grid reference edge 2.
	4. Lower leveling pads until they just touch floor. Leveling pads must not sit across floor tile edge at front of CPU.
	5. Lower leveling pads equally until they remove weight from casters. Caster must be able to turn freely.
	6. Visually inspect CPU to see that it is in general alignment with surrounding room vertical and horizontal surfaces. Adjust leveling pads as necessary.
	7. Check that leveling pad adjustments permit casters to turn freely.

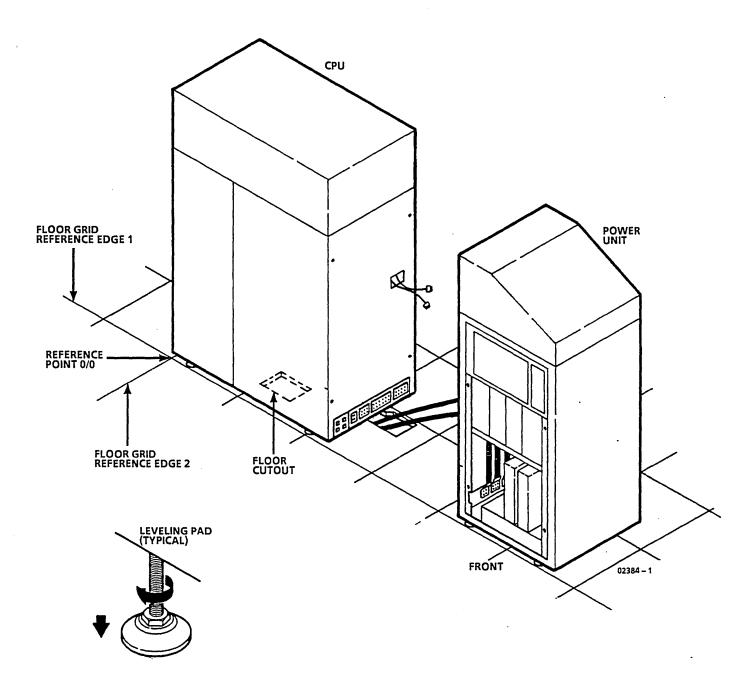


Figure 2-6. CPU Placement

# Prepare Power Bus Plates

		is procedure to grease the power bus connections on the power unit and the efore moving and bolting the units together.
	1.	Be sure that previous procedure is completed.
	2.	Remove shipping fixture (figure 2-7) from power unit power bus plates. Remove mounting bolts from rear of plates, inside unit. (Use a 1/2-in deep socket on a ratchet wrench.)
	3.	Remove shipping fixture from CPU power bus plates. Remove mounting bolts from outside of unit.
		Remove shipping fixture for power cords, if present. Remove mounting bolts from inside unit.
	5.	Clean mating surfaces of CPU and power unit power bus plates surfaces by rubbing with cleaning pad.
		<b>AWARNING</b>
•		Do not come in direct contact with electrical grease. It may irritate the skin and is harmful if swallowed.
•	6.	
		and is harmful if swallowed.
-	7.	Put on protective gloves (supplied with equipment).  Use cleaning cloth (supplied with equipment) to apply and spread a thin layer
	7. 8.	Put on protective gloves (supplied with equipment).  Use cleaning cloth (supplied with equipment) to apply and spread a thin layer of electrical grease (supplied with equipment) on power bus plates of both units.  Wipe plates with a clean part of cloth to ensure a minimal layer of grease on
1	7. 8. 9.	Put on protective gloves (supplied with equipment).  Use cleaning cloth (supplied with equipment) to apply and spread a thin layer of electrical grease (supplied with equipment) on power bus plates of both units.  Wipe plates with a clean part of cloth to ensure a minimal layer of grease on plates.  Set aside and label mounting bolts from shipping fixture to prevent them from

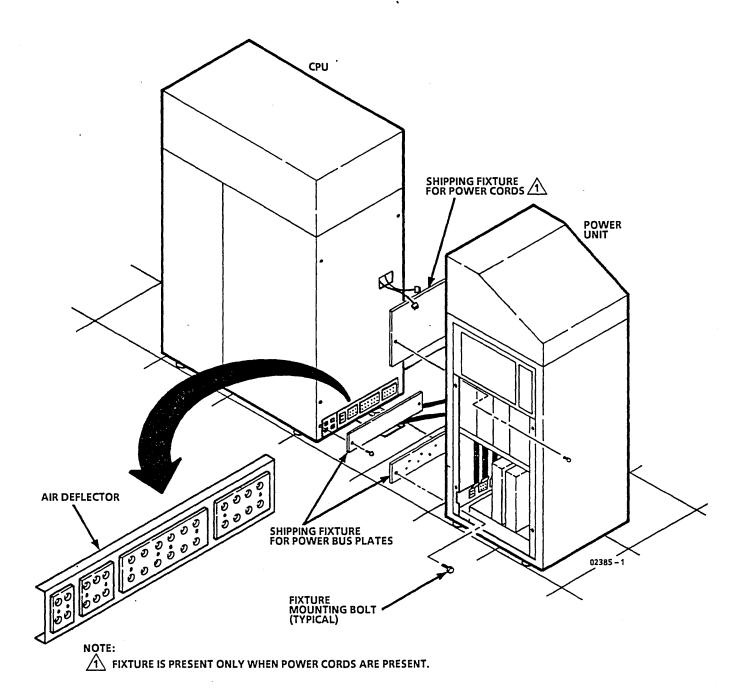


Figure 2-7. Power Bus Plate Preparations

## Place and Bolt Power Unit

	is procedure to move the power unit into position next to the CPU and to bolt it CPU.
 1.	Be sure that previous procedure is completed.
 2.	Inspect copper fingers around interface openings on power unit. Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)
	<b>AWARNING</b>
	Use care when moving power unit to prevent a caster from rolling into floor cutout and tipping, possibly overturning, the unit.
 3.	Move power unit near to and in line with CPU while routing power cords, if present, into floor cutout (figure 2-8).
 4.	Connect CPU blower cable connectors J1 and J2 to power unit cable connectors 1A2P1 and 1A2P2. Pull on connectors to ensure that they are locked together.
 5.	Move power unit against CPU being careful not to pinch cables.
 6.	Install two lower 5/16 x 1-1/4-in bolts (with washers) loosely through power unit into CPU fixed nuts.
 7.	Unlatch and open front and rear CPU doors.
 8.	Adjust two power unit leveling pads nearest to CPU so that front and rear alignment marks align with those on CPU. CPU front and rear doors next to alignment marks may be removed for better visibility of alignment marks.
 9.	Adjust power unit leveling pads furthest from CPU until vertical surfaces between units appear parallel.
 10.	Install two upper $5/16 \times 2$ -in bolts (without washers) loosely through power unit into CPU fixed nuts.
 11.	Tighten lower and upper bolts just enough to pull units together. Then loosen lower and upper bolts one turn to permit final leveling in a later procedure.

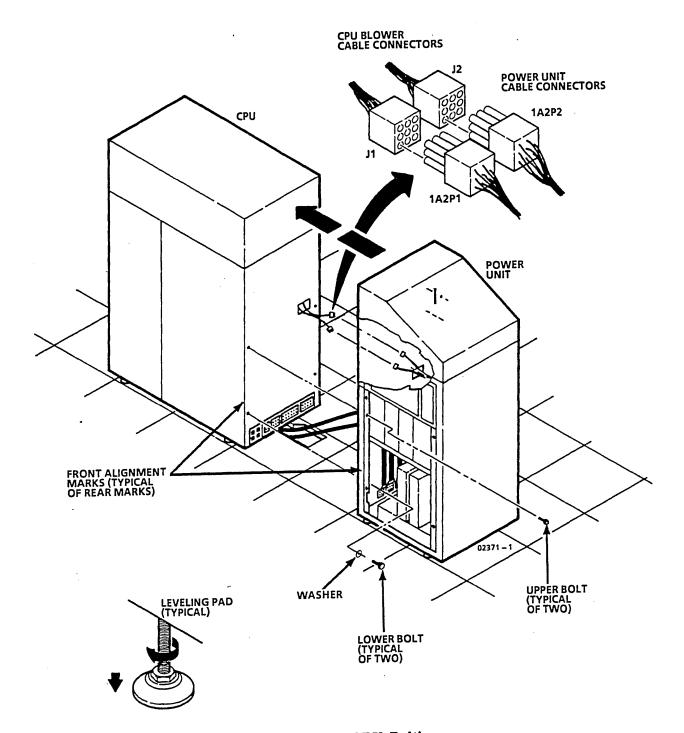


Figure 2-8. CPU Bolting

#### Connect Power Bus Plates

Use this procedure to bolt power unit power bus plates to CPU power bus plates. 1. Be sure that previous procedure is completed. **ACAUTION** Use extreme care to ensure that the air deflector, set in and around the CPU power bus plates, does not protrude and get pinched between the CPU and power unit plates during bolting. 2. Check that air deflector does not overlap edges of CPU power bus plates (figure 2-9). 3. Align middle power bus plate in power unit to its mating plate in CPU, fitting plate guide pins into mating guide pin holes (figure 2-9). If mating plates do not align: \_\_ a. Adjust unit alignment with minor adjustments to leveling pads. \_\_\_ b. Maintain alignment of alignment marks between units. **ACAUTION** Install washers with smooth sides toward bus plates to prevent marring of the plates. 4. Hand-thread 5/16 x 1-1/4-in bolts (with washers) into plates. This may require one installer to align and hold plates while second installer hand-threads bolts. 5. Align and hand-thread bolts in remaining power bus plates. 6. Set torque wrench (supplied with equipment) to 15.8 N·m (140 lbf·in). 7. Tighten all bus plate bolts with torque wrench, using 1/2-in deep socket (supplied with equipment). \_\_ 8. Check that air deflector is not pinched between power bus plates by pressing deflector between plates with finger or some small object. Deflector will flex, if it is not pinched.

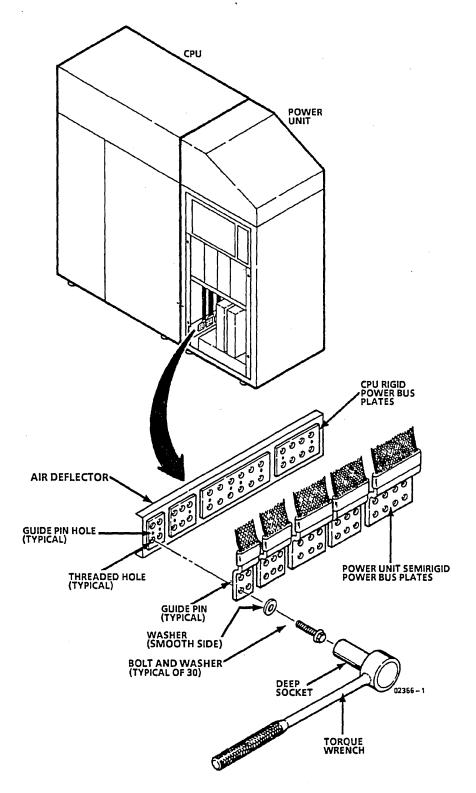


Figure 2-9. Power Bus Plate Connections

## Align Power Unit

tigh	ten the bolts between the units.
	1. Be sure that previous procedure is completed.
<u>.</u>	2. Close and latch CPU doors.
	3. Visually check for straight front and rear trim lines across units (figure 2-10).
	4. Visually check for parallel surfaces between units. Surfaces may be touching or slightly separated at this time.
	5. Adjust leveling pads to achieve correct visual alignment. Unit alignment marks do not have to align at this time, but any adjustments must be minor to prevent stressing bolts between units.
	6. Check that leveling pad adjustments permit casters to turn freely.
	7. Tighten bolts between units.

Use this procedure to make final alignment of the power unit with the CPU and to

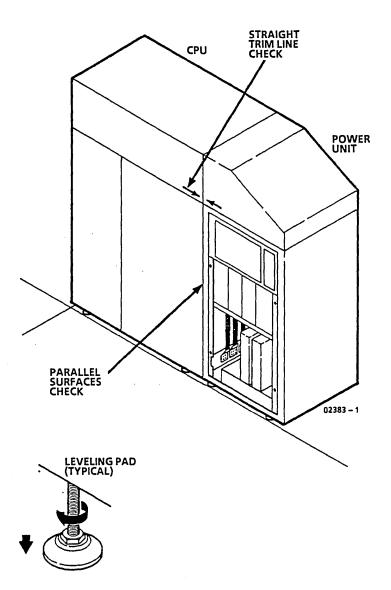


Figure 2-10. Power Unit Alignment

## Place and Bolt IOU

Use	this procedure to move and bolt the IOU to the CPU.
	1. Be sure that previous procedure is completed.
	2. Inspect copper fingers around interface opening on IOU (figure 2-11). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)
	3. Place IOU floor cutout panel in floor.
	<b>AWARNING</b>
	Use care when moving IOU to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.
	4. Move IOU up to and in line with CPU.
	5. Unlatch and open IOU doors.
	6. Place a supplied 1/4-in spacer plate under each leveling pad.
	7. Adjust IOU leveling pads, nearest CPU, so that bolt holes in units align. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor.
	8. Install two 5/16 x 2-1/4-in bolts (with washers and lock washers) loosely through IOU into CPU fixed nuts.
	9. Adjust two IOU leveling pads furthest from CPU so that surfaces between units appear parrallel.
1	10. Close and latch IOU doors.
1	11. Visually check for straight front and rear trim lines across units.
1	12. Visually check for parallel surfaces between units.
;	13. Adjust IOU leveling pads to achieve correct visual alignment. Adjustments must be minor to prevent stressing bolts between units.
;	14. Check that leveling pad adjustments permit casters to turn freely.
:	15. Open IOU doors and tighten bolts between units.

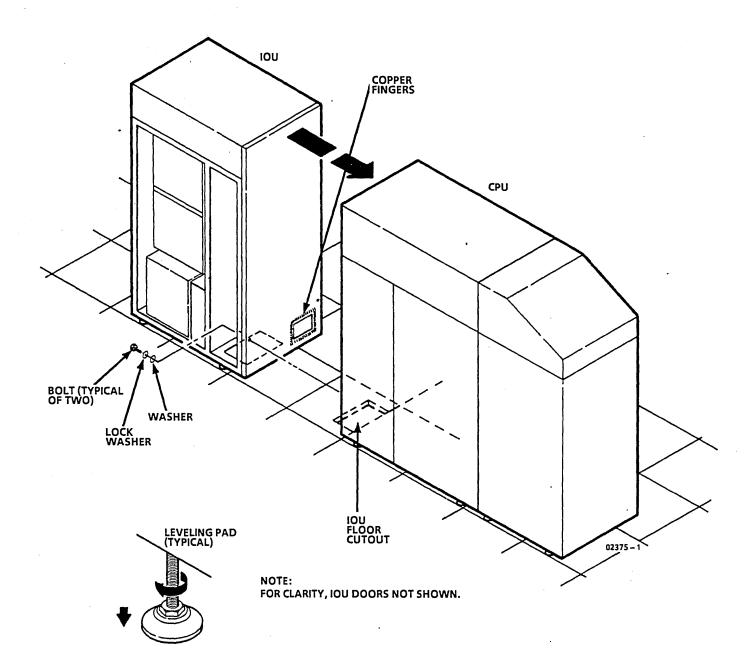


Figure 2-11. IOU Bolting

## Place and Bolt Optional IOU Expansion

Use this procedure to move and bolt the optional IOU expansion to the IOU. If optional IOU expansion is not present, proceed to Connecting Cables. 1. Be sure that previous procedure is completed. 2. Inspect copper fingers around interface opening on optional IOU expansion (figure 2-12). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.) \_ 3. Place IOU expansion floor cutout panel in floor. **AWARNING** Use care when moving IOU expansion to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit. 4. Move IOU expansion up to and in line with IOU. \_\_ 5. Unlatch and open IOU expansion doors. 6. Place a supplied 1/4-in spacer plate under each leveling pad. 7. Adjust IOU expansion leveling pads, nearest IOU, so that bolt holes in units align. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor. \_\_\_\_ 8. Install two 5/16 x 1-1/4-in bolts and nuts (with washers at both ends of bolts) loosely through lower front and rear holes between units. If IOU has threaded bolt holes, use washers only at bolt heads. 9. Adjust two IOU expansion leveling pads furthest from IOU so that surfaces between units appear parallel. \_\_\_ 10. Install remaining six bolts (with washers at both ends of bolts) loosely from IOU expansion to IOU. \_\_\_\_ 11. Close and latch IOU and IOU expansion doors. \_\_\_\_12. Visually check for straight front and rear trim lines across units. \_\_\_ 13. Visually check for parallel surfaces between units. \_\_\_\_14. Adjust IOU expansion leveling pads to achieve correct visual alignment. Adjustments must be minor to prevent stressing bolts between units. \_\_\_\_ 15. Check that leveling pad adjustments permit casters to turn freely.

\_\_\_ 16. Open IOU doors and tighten two bottom, two top, and then remaining bolts.

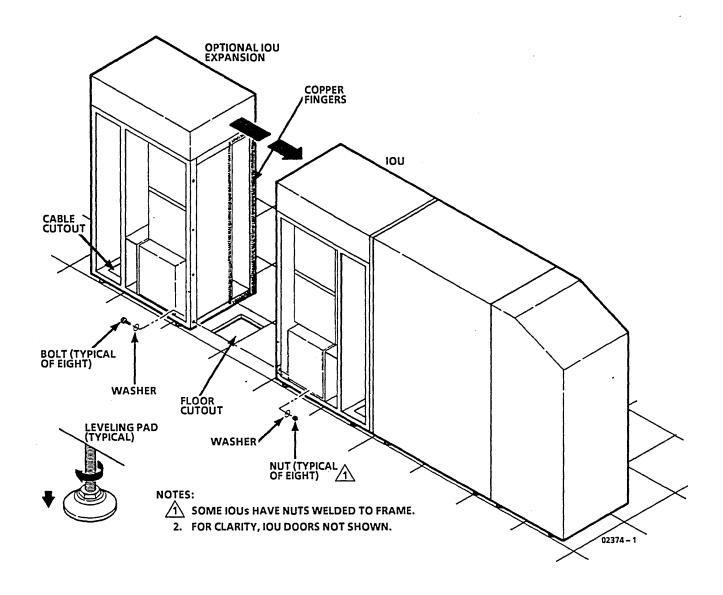


Figure 2-12. Optional IOU Expansion Bolting

## Place Optional Standalone IOU

Use this procedure to place the optional standalone IOU. If optional standalone IOU is not present, proceed to Install IOU Trim Panels.

- 1. Be sure that site preparations have identified optional standalone IOU floor reference point 0/0 (figure 2-13).
  - \_ 2. Place standalone IOU floor cutout panel in floor.

# **AWARNING**

Use care when moving standalone IOU to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.

 3. Move standalone IOU over floor cutout so that:	
a. Right front corner of frame is at reference point 0/0, intersection grid reference edges 1 and 2.	of floor
b. Front of frame is in line with floor grid reference edge 1.	
c. Right end of IOU frame is in line with floor grid reference edge	2.
 4. Place a supplied 1/4-in spacer plate under each leveling pad.	
 5. Lower leveling pads until they just touch floor. Leveling pads must not across floor tile edge at front of standalone IOU.	sit
 <ol> <li>Lower leveling pads equally until they remove weight from casters. Cast must be able to turn freely. To prevent screwing pads out of IOU, do no any pad to raise casters more than 1/4-in off floor.</li> </ol>	
 <ol> <li>Visually inspect standalone IOU to see that it is in general alignment we surrounding room vertical and horizontal surfaces. Adjust leveling pads a necessary.</li> </ol>	
 8. Check that leveling pad adjustments permit casters to turn freely.	

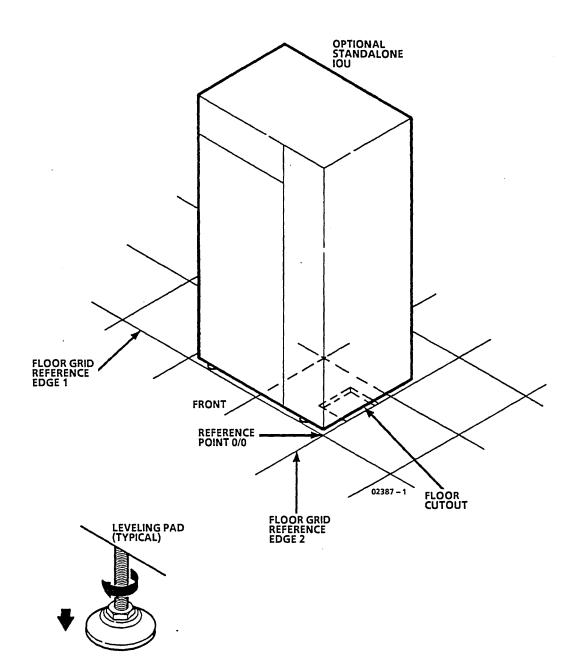


Figure 2-13. Optional Standalone IOU Placement

## Place and Bolt Optional Standalone IOU Expansion

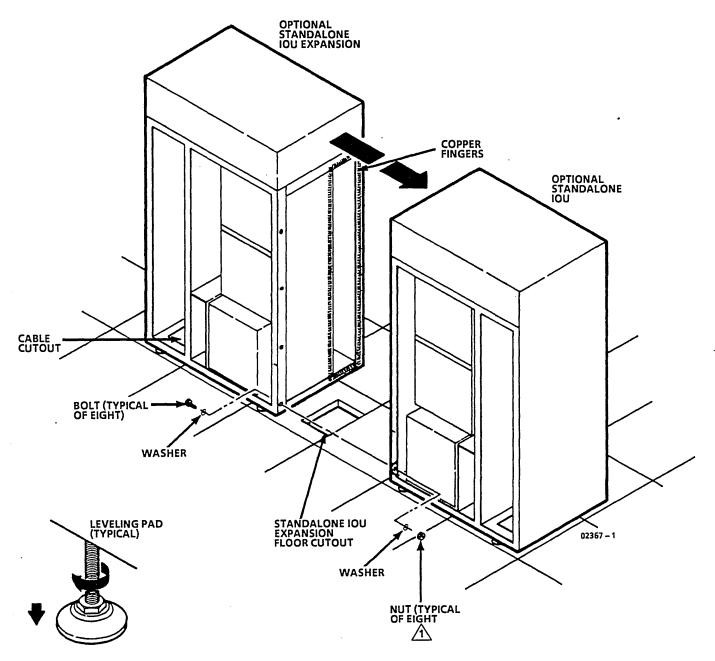
Use this procedure to place and bolt the optional standalone IOU expansion to the optional standalone IOU. If optional standalone IOU expansion is not present, proceed to Connecting Cables.

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- 2. Inspect copper fingers around interface openings on standalone IOU expansion (figure 2-14). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)
  - 3. Place standalone IOU expansion floor cutout panel in floor.

# **AWARNING**

	Use care when moving standalone IOU expansion to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.
4	4. Move standalone IOU expansion up to and in line with standalone IOU.
8	5. Unlatch and open doors of both standalone IOUs.
6	3. Place a supplied 1/4-in spacer plate under each leveling pad.
7	7. Adjust standalone IOU expansion leveling pads, nearest standalone IOU, so that bolt holes in units align. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor.
8	3. Install two 5/16 x 1-1/4-in bolts and nuts (with washers at both ends of bolts) loosely through lower front and rear holes between units. If standalone IOU has threaded bolt holes, use washers only at bolt heads.
<sup>9</sup>	O. Adjust two standalone IOU expansion leveling pads furthest from standalone IOU so that surfaces between units appear parallel.
10	). Install remaining six bolts (with washers at both end of bolts) loosely between units.
11	. Close and latch doors of both standalone IOUs.
12	2. Visually check for straight front and rear trim lines across units.
13	3. Visually check for parallel surfaces between units.
14	A. Adjust standalone IOU expansion leveling pads to achieve correct visual alignment. Adjustments must be minor to prevent stressing bolts between units.
15	6. Check that leveling pad adjustments permit casters to turn freely.
16	6. Open IOU doors and tighten two bottom, two top, and then remaining bolts.



#### NOTES:

⚠ SOME OPTIONAL STANDALONE UNITS HAVE NUTS WELDED TO FRAME.

2. FOR CLARITY, DOORS NOT SHOWN.

Figure 2-14. Optional Standalone IOU Expansion Bolting

## Install IOU Trim Panels

Use this procedure when the optional IOU expansion or optional standalone IOU expansion is present. The procedure is necessary only to install front and rear trim panels between adjacent IOUs.

 1. Be sur	e that placement and boiting procedures are completed.
 2. Remov	e and unpackage trim panels, shipped inside one IOU.
	re trim panel brackets and IOU mounting fixtures to become familiar with installation (figure 2-15).
	one trim panel against IOU and about 100 mm (4 in) above IOU ing fixtures.
 5. Push t fixture	rim panel in and down to secure panel brackets into IOU mounting s.
 6. Test the is loos	nat panel is securely mounted by pulling gently on panel corners. If panel e:
a.	Remove panel.
b.	Tighten panel brackets, if necessary.
c.	Repeat panel installation.
 7. Install	second trim panel in same manner.
 8. Install	trim panels on optional standalone IOUs.

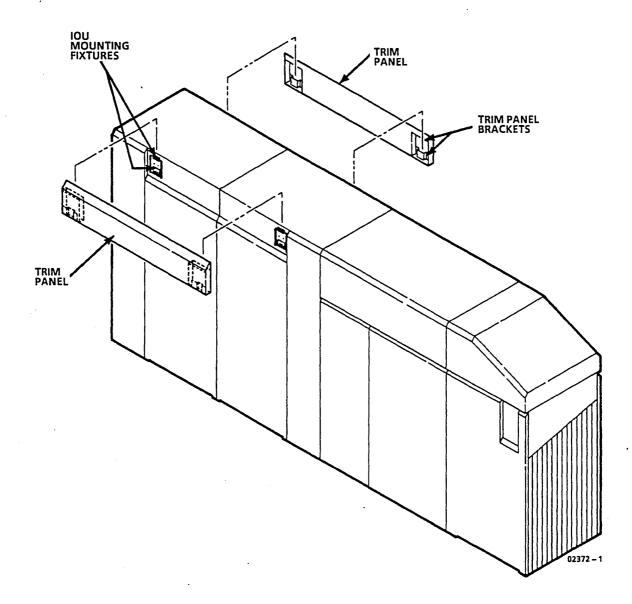


Figure 2-15. IOU Trim Panels

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Placing and Bolting Units

## Connecting Cables

The following procedures describe signal and control cable connections.

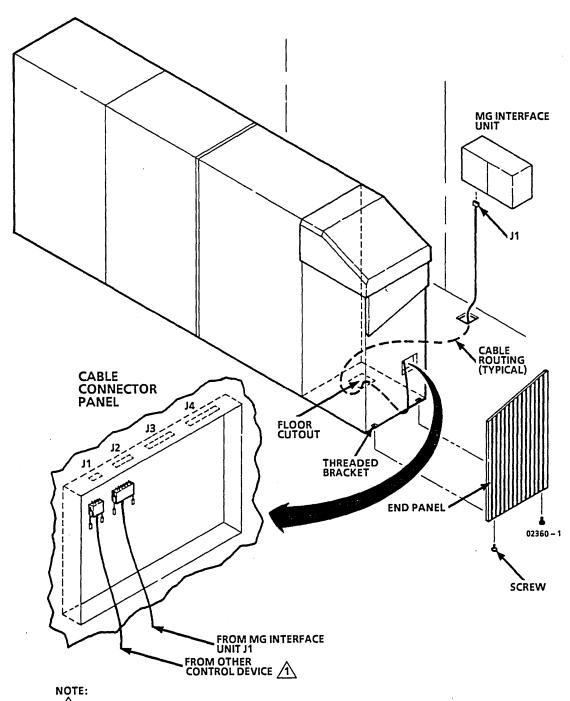
- Connect MG Interface Unit Cables to Power Unit
- Connect Power Unit Cables to CPU
- Connect CP-0 and CP-1 Cables to IOU
- Connect Optional IOU Expansion Cables to IOU
- Connect Optional Standalone IOU Cables to CPU
- Connect Optional Standalone IOU Expansion Cables to Standalone IOU
- Connect IOU Power Multiplexer Cables
- Connect Start/Short Warning Cables
- Connect Long Warning Cables
- Connect IOU Channel Cables

# **ACAUTION**

- When connecting logic cables, wear an antistatic smock and an antistatic wrist strap connected to frame ground to protect microcircuits from damage.
- Use care in handling all cables to prevent damage to their connector pins and jacks.

#### Connect MG Interface Unit Cable to Power Unit

Use this procedure to connect control cables from the MG interface unit and from another control device, when used, to the power unit. \_\_\_\_ 1. Be sure that MG interface unit installation is completed (installed with MG set). 2. Remove end panel from power unit by removing two bottom thumbscrews, moving bottom of panel slightly outward and then down (figure 2-16). 3. Route cable from MG interface unit up through floor cutout, under power unit, and up to cable connector panel on power unit. This is a 15.2-m (50-ft) cable (P/N 10292400) that ships with the MG interface unit. 4. Remove jumper plug from cable connector panel connector J2. 5. Connect cable from MG interface unit to power unit J2. 6. Route cable, if present, from other control device up through floor cutout, under power unit, and up to cable connector panel. Instructions for the connection of this cable to other equipment are unique to each site. They are supplied by Control Data as part of special installations. \_ 7. Connect other control device cable, if present, to power unit J1. \_\_ 8. Do not install end panel on power unit.



THIS IS A NONSTANDARD CONNECTION THAT IS PRESENT ONLY FOR SPECIAL INSTALLATIONS.

Figure 2-16. MG Interface Cable Connections

#### Connect Power Unit Cables to CPU

Use this procedure to connect blower and control cables from the power unit to the CPU.

- 1. Be sure that front airflow control panel is removed from the power unit. (Done in a previous procedure.)
- 2. Connect cables from power unit in order listed in table 2-1 to CPU connector header (figure 2-17). Fasten cables with a short-shaft slotted screwdriver.

Table 2-1. Power Unit to CPU Cable Connections

Power Unit	CPU Connector Header		
1A2P6	J6	,	
1A2P4	J4		
1A2P5	J5		
1A2P3	J3		

Note:

Shipping location of cables is in lower front corner of CPU.

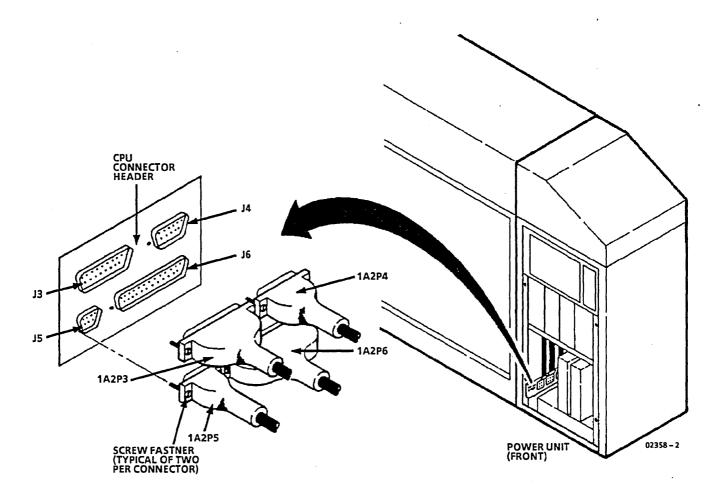


Figure 2-17. Power Unit to CPU Cable Connections

#### Connect CP-0 and CP-1 Cables to IOU

Use this procedure to route and connect flat logic cables from preconnected side interconnect boards (SIBs) in CP-0 and CP-1 to a header panel in the IOU.

 1.	Be	sure	that	bolting	together	of	units	is	completed

2. Access SIB cables from bottom and front of CPU (figure	2-18)
---	-------

- 3. Remove protective coverings from SIB cable connectors.
- 4. Route color-identified cable groups through unit cable openings into IOU. A later procedure routes and connects a coaxial cable located in the same area.

# **▲**CAUTION

To avoid damage to connectors, insert connectors with keyed slots facing left.

- 5. Connect SIB cables to IOU header (hdr) panel, in bottom to top order as listed in table 2-2.
- 6. Fasten cables through strain relief, located above cable connections.

Table 2-2. SIB to IOU Header Panel Cable Connections

Blue Group		Red Group		Orange Group		Yellow Group		Green Group	
SIB Cable <sup>1</sup>	IOU Hdr	SIB Cable <sup>1</sup>	IOU Hdr	SIB Cable <sup>1</sup>	IOU Hdr	SIB Cable <sup>1</sup>	IOU Hdr	SIB Cable <sup>1</sup>	IOU Hdr
P76 P77 P78	J76 J77 J78	P62 P63 P64 P65 P66	J62 J63 J64 J65 J66	P59 P60 P61	J59 J60 J61	P53 P54 P55 P56 P57	J53 J54 J55 J56 J57	P50 P51 P52 P70 P71	J50 J51 J52 J70 J71
(Note <sup>2</sup> )		P67	J67	(Note <sup>3</sup> )		P58	J58	P72	J72

#### Notes:

- 1. Cables ship in bottom left end of CPU.
- 2. These connections apply only when optional CP-1 is present, as indicated by the presence of CP-1 logic modules.
- 3. IOU header connectors J73, J74, and J75 are unused.

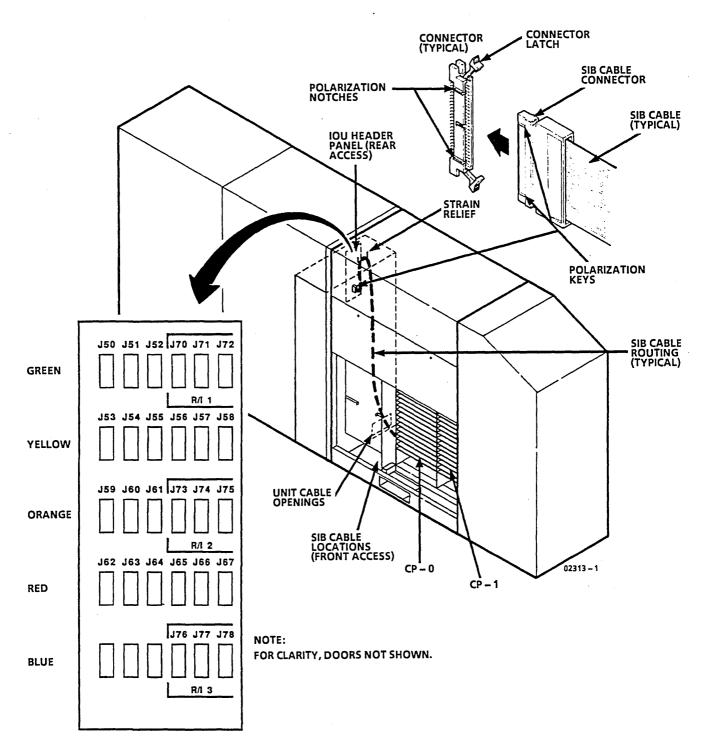


Figure 2-18. CP-0/CP-1 to IOU Cable Connections

## Connect Optional IOU Expansion Cables to IOU

Use this procedure to connect logic cables from the backpanels of the optional IOU expansion to the IOU connector panel.

- \_\_\_ 1. Be sure that bolting together of units is completed.
- 2. Cut restraint from connector J28 and shipping bracket in IOU expansion (figure 2-19).
- \_\_\_ 3. Remove protective cover from connector and connect it to J28 on IOU connector panel.
- 4. Work from lower to higher numbered connectors, cutting each from shipping bracket and connecting it to IOU connector panel in same manner and in order as listed in table 2-3.

Table 2-3. Optional IOU Expansion Cable Connections

Optional IOU Expansion Shipping Bracket	IOU Connector Panel
J28	J28
J29	J29
J30	J30
J31	J31
J32	J32
J33	J33
J34	J34
J35	J35
J36	J36
J37	J37
J38	J38
J39	J39

#### Notes:

- 1. Cables ship attached to shipping bracket in optional IOU expansion.
- 2. Cable connections J33 through J39 apply only to CYBER 960 and are unused in CYBER 962.

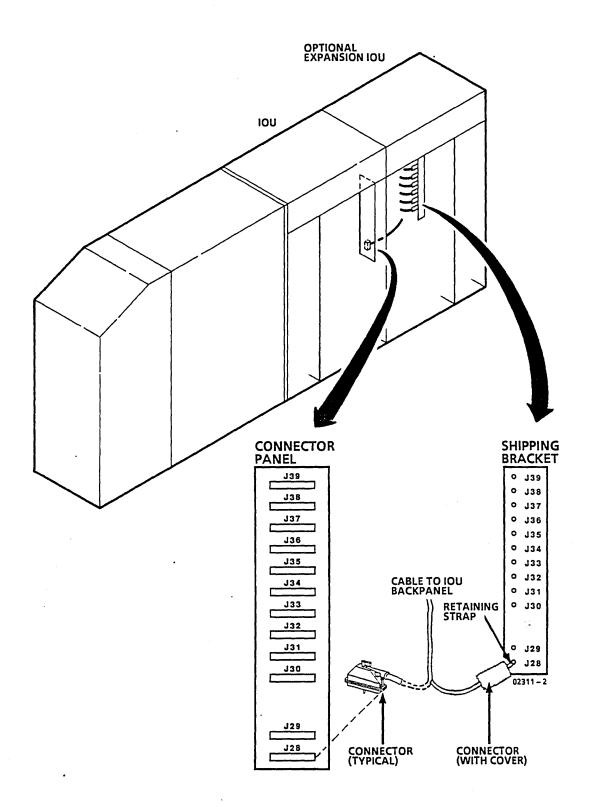


Figure 2-19. Optional IOU Expansion to IOU Cable Connections

# Connect Optional Standalone IOU Cables to CPU

this procedure to connect logic and clock cables between the CPU and optional dalone IOU.
 1. Place logic and clock cables (shipped with equipment) beneath raised floor between CPU and standalone IOU (figure 2-20).
 2. Pull CPU cable ends into auxiliary port and standalone IOU.
NOTE
A later manual revision will define the cable connections.

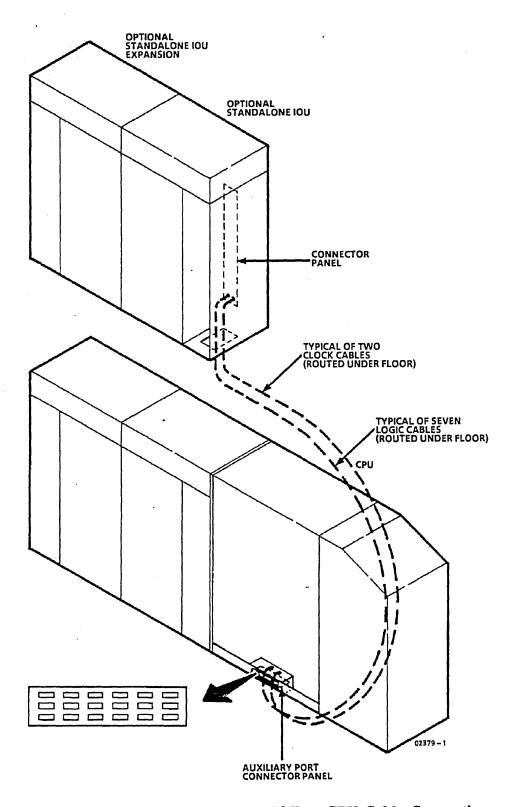


Figure 2-20. Optional Standalone IOU to CPU Cable Connections

# Connect Optional Standalone IOU Expansion Cables to Standalone IOU

Use this procedure to connect logic cables from the backpanels of the optional standalone IOU expansion to a connector panel in the optional standalone IOU.

- \_\_\_ 1. Be sure that standalone units are bolted together.
- 2. Cut shipping restraint from connector J28 and shipping bracket in standalone IOU expansion (figure 2-21).
- 3. Remove protective cover from connector and connect it to J28 on IOU connector panel.
- 4. Work from lower to higher numbered connectors, cutting each from shipping bracket and connecting it to IOU connector panel in same manner and in order listed in table 2-4.

Table 2-4. Optl Standalone IOU Exp to Optl Standalone IOU Cable Connections

Optional Standalone IOU Expansion Shipping Bracket <sup>1</sup>	Optional Standalone IOU Connector Panel	
J28	J28	
J29	J29	
J30	J30	
J31	J31	
J32	J32 .	

#### Note:

1. Cables are shipped attached to shipping bracket in optional standalone IOU expansion.

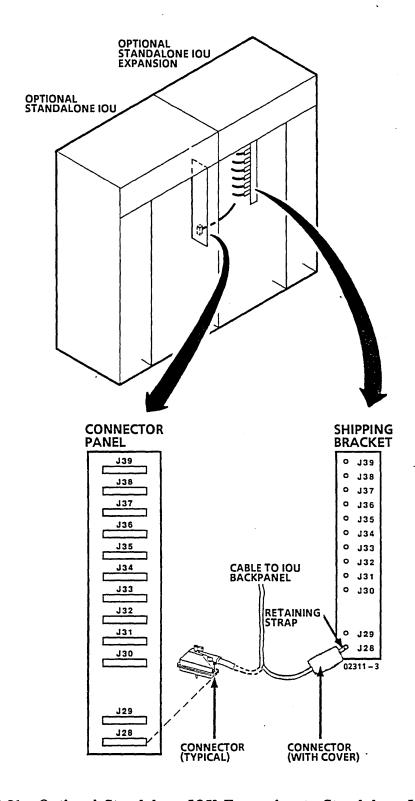


Figure 2-21. Optional Standalone IOU Expansion to Standalone IOU Cable Connections

## Connect IOU Power Multiplexer Cables

Use this procedure to route and connect IOU power multiplexer cables from the CPU to the IOU and from the IOU to the optional IOUs.

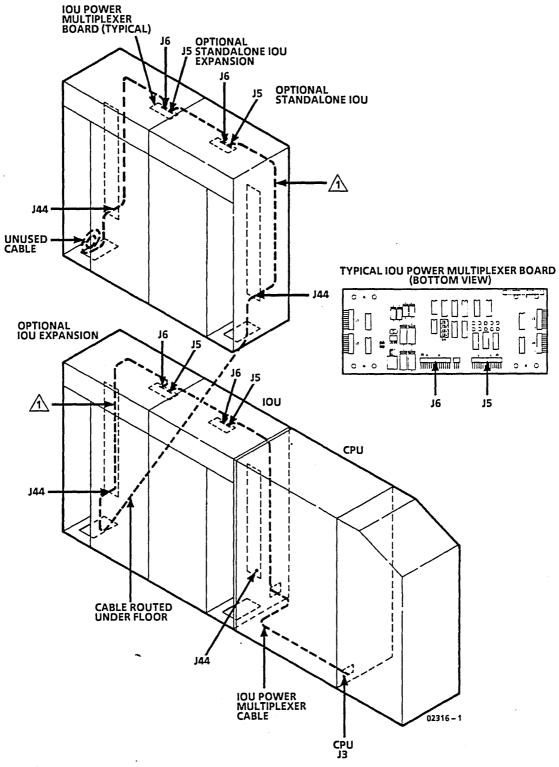
- \_\_\_\_ 1. Route and connect cables as listed in table 2-5 and shown in figure 2-22. Cables route within units, except for cable between optional IOU expansion (exp) and optional standalone IOU, which routes under raised floor.
- \_\_\_ 2. Use cable ties, as necessary, inside units to hold cables in place.

Table 2-5. IOU Power Multiplexer Cable Connections

From	То	Cable Shipping Location	Cable P/N, Length
CPU J3 (Note <sup>1</sup> )	IOU mux bd J5 (Note <sup>2</sup> )	In bottom of CPU.	22133977, 6.1 m (20 ft)
IOU mux bd J6	Optl IOU exp mux bd J5 (Note <sup>1</sup> )	In optl IOU exp.	
Optl IOU exp mux bd J6	Optl IOU exp connector panel J44 (rear)	In optl IOU exp; cable is preinstalled.	
Optl IOU exp connector panel J44 (front) (Note <sup>1</sup> )	Optl standalone IOU connector panel J44 (front)	In optl standalone IOU; cable may not be used, depending on configuration.	23107066, 15.2 m (50 ft)
Optl standalone IOU connector panel J44 (rear)	Optl standalone IOU mux bd J5	In optl standalone IOU; cable is preinstalled.	
Optl standalone IOU mux bd J6	Optl standalone IOU exp mux bd J5 (Note <sup>1</sup> )	In optl standalone IOU exp.	
Optl standalone IOU exp mux bd J6 (Note <sup>1</sup> )	Optl standalone IOU exp connector panel J44 (rear)	In optl standalone IOU exp.	
Optl standalone IOU exp connector panel J44 (front)	Cable is unconnected	In optl standalone IOU exp.	23107066, 15.2 m (50 ft)

#### Note:

- 1. Cable ships preconnected at this end.
- 2. Some IOUs ship with a preconnected cable between the multiplexer board J5 and connector panel J44. This cable is unused in this system and must be disconnected from J5.



NOTE:

THIS CABLE IS PREINSTALLED AND IS SHOWN ONLY FOR CLARITY.

Figure 2-22. IOU Power Multiplexer Cable Connections

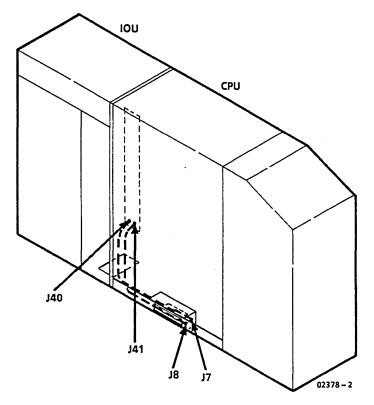
# Connect Start/Short Warning Cables

this procedure to route and connect start/short warning cables between the CPU IOU and to the optional IOUs.
 1. Identify IOU configuration being installed with one of the tables (2-6 through 2-9) and one of the figures (2-23 through 2-26).
 2. Connect cables as listed in identified table and figure.
a. Route cables that go between units under raised floor and through floor and unit cutouts.
b. Install cable ties, as necessary, inside units to hold cables in place.

Table 2-6. Start/Short Warning Cable Connections (One IOU)

From	То	Cable P/N, Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	CPU J8	53615356, 3 m (10 ft)

Cables are shipped preconnected at one end.



NOTE: CABLES BETWEEN IOU AND CPU ROUTE UNDER THE FLOOR.

Figure 2-23. Start/Short Warning Cable Connections (One IOU)

Table 2-7. Start/Short Warning Cable Connections (Two IOUs)

From	То	Cable P/N, Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	Optl IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl IOU exp connector panel J41	CPU J8	53615357, 15.2 m (50 ft)

Cables are shipped preconnected at one end.

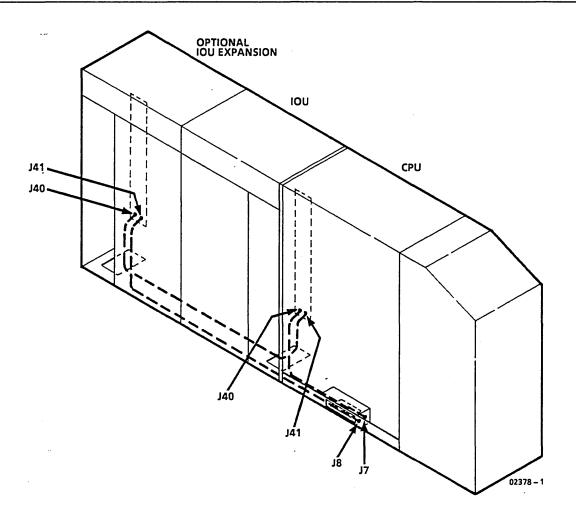


Figure 2-24. Start/Short Warning Cable Connections (Two IOUs)

Table 2-8. Start/Short Warning Cable Connections (Three IOUs)

From	То	Cable P/N, Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	Optl IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl IOU exp connector panel J41	Optl standalone IOU connector panel J40	53615357, 15.2 m (50 ft)
Optl standalone IOU J41	CPU J8	53615357, 15.2 m (50 ft)

Cables are shipped preconnected at one end.

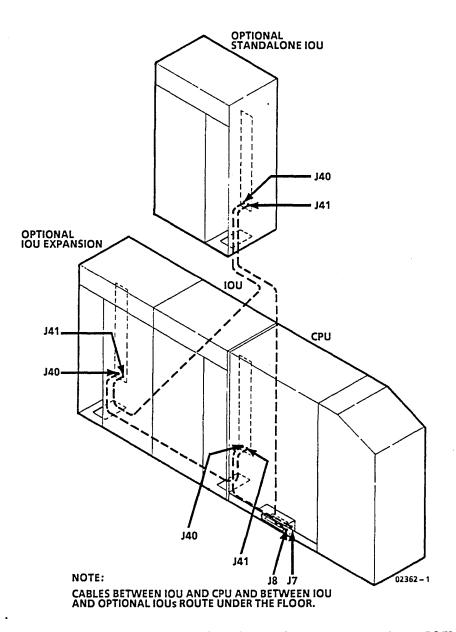


Figure 2-25. Start/Short Warning Cable Connections (Three IOUs)

Table 2-9. Start/Short Warning Cable Connections (Four IOUs)

From	То	Cable P/N Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	Optl IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl IOU exp connector panel J41	Optl standalone IOU connector panel J40	53615357, 15.2 m (50 ft)
Optl standalone IOU connector panel J41	Optl standalone IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl standalone IOU exp connector panel J41	CPU J8	53615357, 15.2 m (50 ft)

Cables are shipped preconnected at one end.

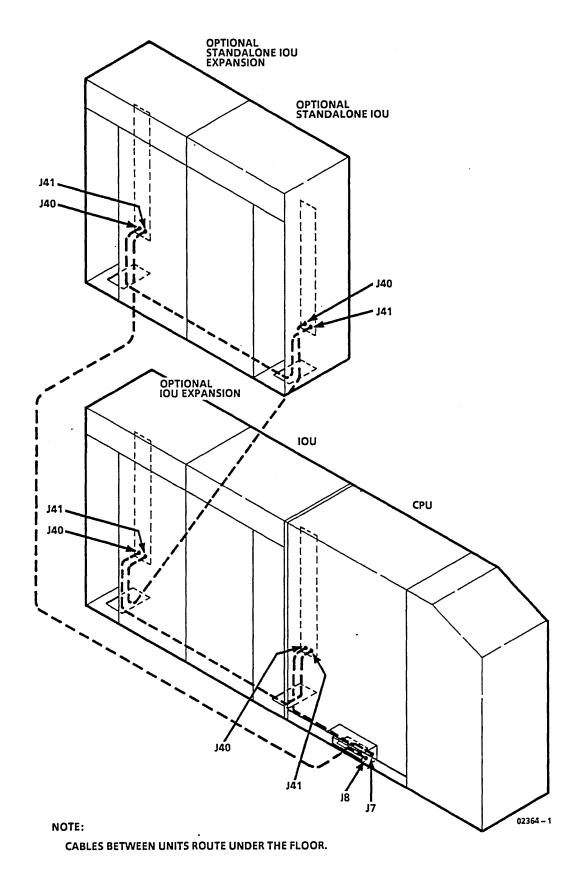


Figure 2-26. Start/Short Warning Cable Connections (Four IOUs)

### Connect Long Warning Cables

Use this procedure to route and connect long warning cables between the IOU and optional IOUs.

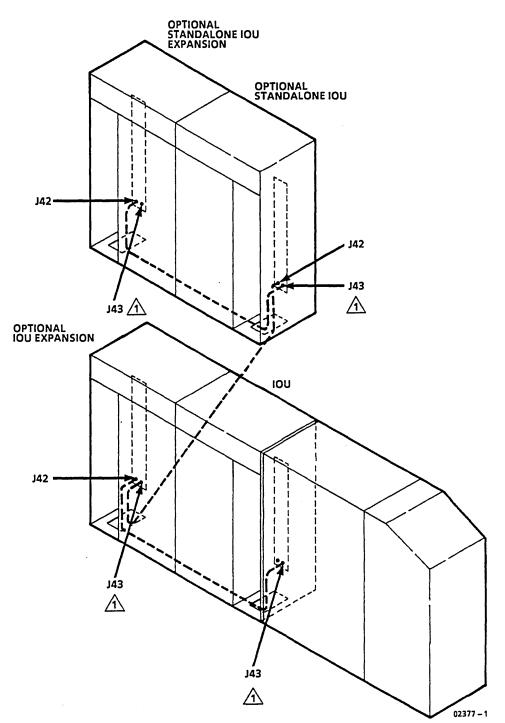
- \_\_\_\_ 1. Route and connect cables as listed in table 2-10 and shown in figure 2-27. Cables route under floor.
- 2. Install cable ties, as necessary, to hold cables in place.

Table 2-10. Long Warning Cable Connections

From <sup>1</sup>	To <sup>1</sup>	Cable P/N, Length		
IOU J43	Terminator <sup>2</sup> or optl IOU expansion J42	53615356, 3 m (10 ft)		
Optl IOU expansion J43	Terminator <sup>2</sup> or optl standalone IOU J42	53615357, 15.2 m (50 ft)		
Optl standalone IOU J43	Terminator <sup>2</sup> or optl standalone IOU expansion J42	53615356, 3 m (10 ft)		
Optl standalone IOU expansion J43	Terminator <sup>2</sup>			

#### Notes:

- 1. Cables are shipped preconnected at one end.
- 2. The terminator (P/N 23102122) ships preconnected to the last J43 in the series of connections.



NOTES:

CONNECTOR J43 REQUIRES INSTALLATION OF A SUPPLIED TERMINATOR WHEN J43 DOES NOT CONNECT TO ANOTHER UNIT.

2. CABLES BETWEEN IOU AND CPU AND BETWEEN IOU AND OPTIONAL IOUS ROUTE UNDER THE FLOOR.

Figure 2-27. Long Warning Cable Connections

### Connect IOU Channel Cables

Use this procedure to connect cables to the cable connector panels in the IOU and optional IOUs and to record the cable connections for future reference.

- 1. Connect channel cables to each IOU connector panel (figure 2-28) from bottom to top order to permit best accessibility to panel connectors.
- 2. Record each connection for future reference in tables 2-11 through 2-14.

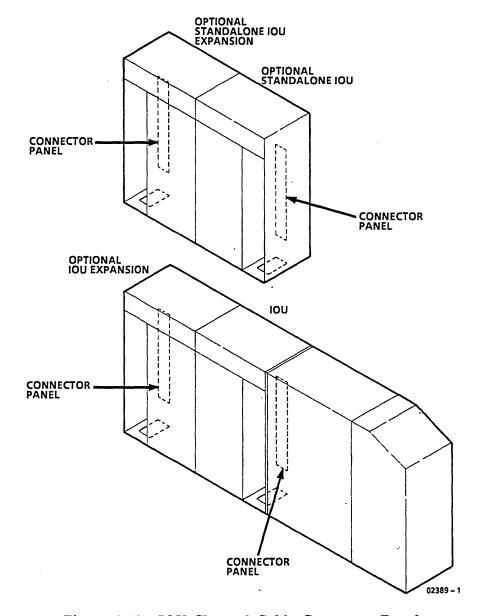


Figure 2-28. IOU Channel Cable Connector Panels

Table 2-11. IOU Channel Cable Connections

Channel Number	Peripheral Equipment
OH ANNUA	
CHANNEL	·
CHANNEL	
CHANNEL	
CHANNEL	·
CHANNEL	
CHANNEL	,
CHANNEL	•
CHANNEL	

Table 2-12. Optional IOU Expansion Channel Cable Connections

Channel Num	ber	Peripheral Equipment
CHANNEL		
CHANNEL	·	
CHANNEL		
CHANNEL	-	
CHANNEL		
<u> </u>		

Table 2-13. Optional Standalone IOU Channel Cable Connections

Channel Num	ber	Peripheral Equipment
CHANNEL		
CHANNEL		
CHANNEL		

# **Checking Prepower Conditions**

The following procedures check connections to ensure that unit blowers operate at the available 50/60-Hz site voltage. The procedures also specify control switch and power switch positions prior to the connection of power wiring to the units.

- Check Power Unit 50/60-Hz Cable Connectors
- Check IOU Blower Transformer Voltage Taps
- Check IOU Multiplexer Board Switches
- Check Seating of IOU Logic Modules
- Set Circuit Breakers and Controls

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Checking Prepower Conditions

## Check Power Unit 50/60-Hz Cable Connectors

Use this procedure to check that cable connections adapt the power unit blowers and power supply to the site 50/60-Hz voltage and to change the cable connections, if necessary.

 1. Be sure that 50/60-Hz power is not applied to power unit.
 2. Be sure to correctly identify site 50/60-Hz voltage to be provided to power unit. Check voltage notations on site power receptacles and circuit breaker panels and through customer.
 3. Check and change power unit connectors P1 through P4 as required to match site voltage:
a. For 50-Hz voltage, connectors must be as shown in figure 2-29.
b. For 60-Hz voltage, connectors must be as shown in figure 2-30.

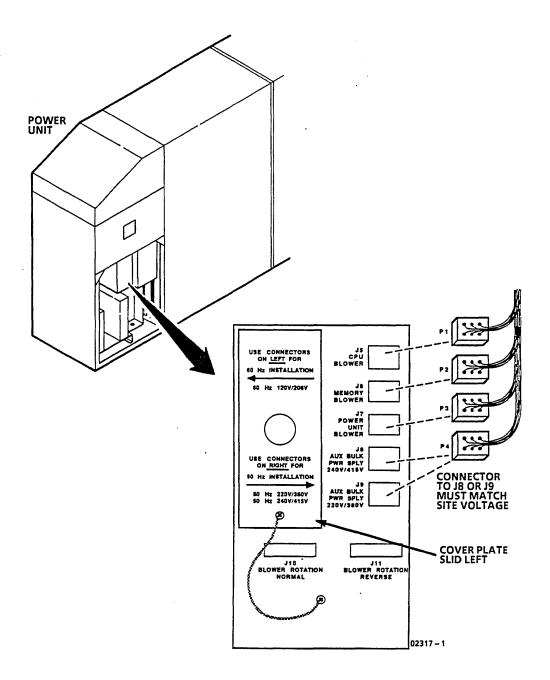


Figure 2-29. Power Unit 50-Hz Cable Connections

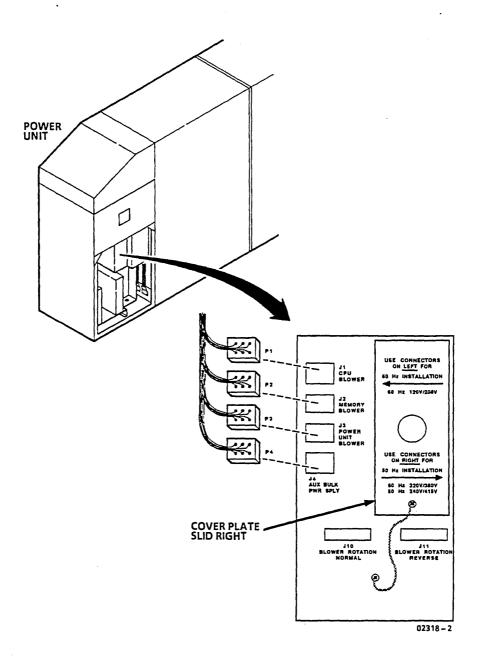


Figure 2-30. Power Unit 60-Hz Cable Connections

### Check IOU Blower Transformer Voltage Taps

Use this procedure to check that transformer tap connections in the IOU and optional IOUs are correct for the site voltage. 1. Read power identification label, located on bottom of IOU in front of cable cutout. Label identifies IOU power requirements: \_\_\_ a. If label requirements match 50/60-Hz site power, go to next procedure. \_\_\_\_ b. If label requirements differ from site 50/60-Hz power, perform remaining steps. 2. Make sure that 50/60-Hz power is not applied to IOU. 3. Access blower transformer terminal strip T5 at rear of power distribution box as shown in figure 2-31. 4. Move single wire labeled RECONNECTABLE from 120V, 220V, 230V, 240V, or 250V terminal on T5 strip to terminal that matches site voltage. 5. Install removed covers and fasten power distribution box in IOU with retaining screw. 6. Repeat this procedure for: \_\_\_ a. Optional IOU expansion. \_\_\_ b. Optional standalone IOU. \_\_\_ c. Optional standalone IOU expansion.

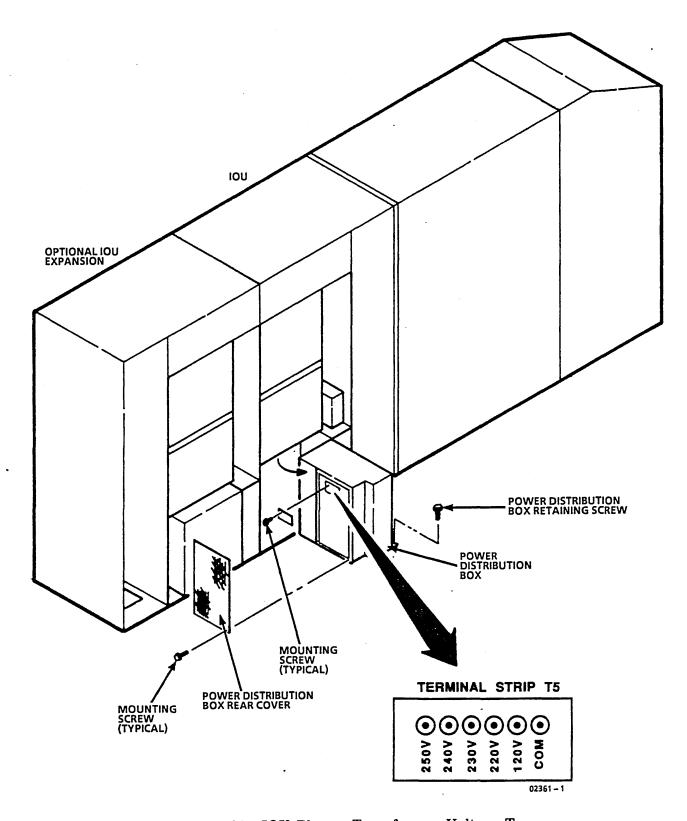


Figure 2-31. IOU Blower Transformer Voltage Taps

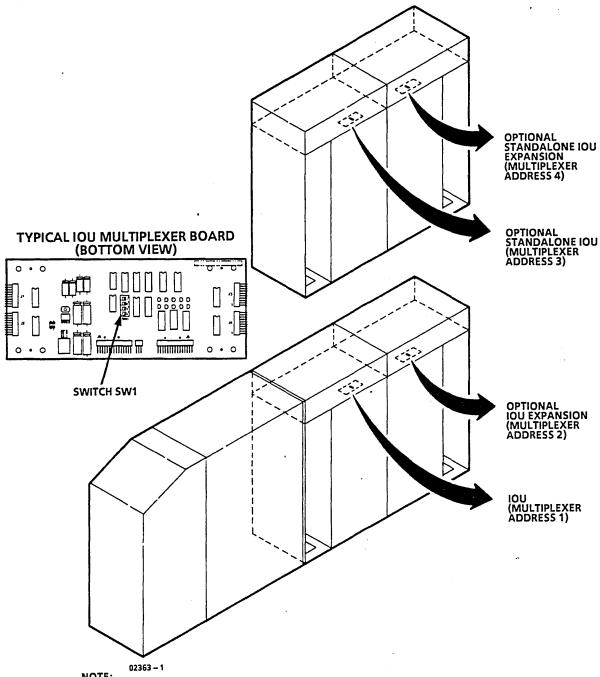
### Check IOU Multiplexer Board Switches

Use this procedure to check that the multiplexer (mux) board switches in each IOU are set to the correct multiplexer address (adrs).

- \_\_\_ 1. Access multiplexer board from rear of IOU or optional IOUs (figure 2-32).
- 2. Check and set switch SW1 on each multiplexer board as listed in table 2-15.

Table 2-15. IOU Multiplexer Board Switch Positions

Switch Location	Switch Numbers	Switch Positions
IOU	1	Away from number 1
(Multiplexer Address 1)	2	Toward number 2
•	3	Toward number 3
	4	Toward number 4
Optional IOU	1	Toward number 1
Expansion	2	Away from number 2
(Multiplexer Address 2)	3	Toward number 3
•	4	Toward number 4
Optional Standalone	1	Away from number 1
IOU	2	Away from number 2
(Multiplexer Address 3)	3	Toward number 3
•	4	Toward number 4
Optional Sandalone	1	Toward number 1
IOU Expansion	2	Toward number 2
(Multiplexer Address 4)	3	Away from number 3
•	4	Toward number 4



NOTE:
THE IOU MULTIPLEXER SWITCHES MAY BE VIEWED BY STANDING AT THE REAR OF AN IOU AND LOOKING IN AND UPWARD.

Figure 2-32. IOU Multiplexer Board Switches

# Check Seating of IOU Logic Modules

Use this procedure to check that all IOU logic modules fully seat in their rear connectors.
1. Be sure that power is not applied to logic modules.
2. Remove front covers from IOU upper and lower logic cages by lifting covers up and away from cages.
<b>ACAUTION</b>
Each IOU module must be checked to prevent the possiblity of damage to the connector contacts during the application of logic power.
3. Place pak insertion tool on top and bottom channels across front of logic cage (figure 2-33).
4. Slide tool on channels so it aligns with a module.
5. Move tool handle downward with enough pressure to press module inward and assure that it is firmly seated in rear connectors.
6. Repeat this check for each module in upper and lower IOU logic cages.
7. Replace front covers on logic cages.
8. Repeat procedure for:
a. Optional IOU expansion.
b. Optional standalone IOU.
c. Optional standalone IOU expansion.
NOTE
If CP regulator pak and logic modules were shipped separately from the CPU, install them at this time. Use the procedures in appendixes A and B.
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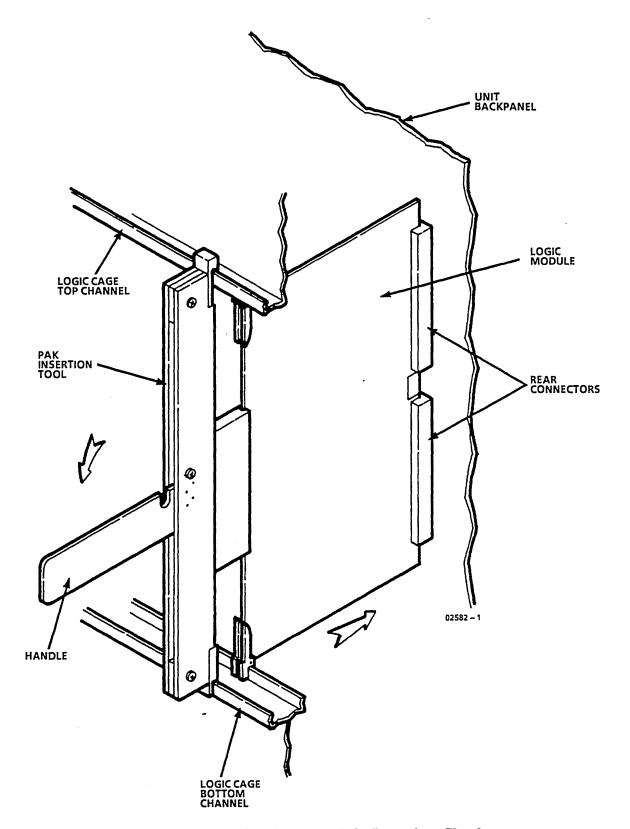


Figure 2-33. IOU Logic Module Insertion Check

### Set Circuit Breakers and Controls

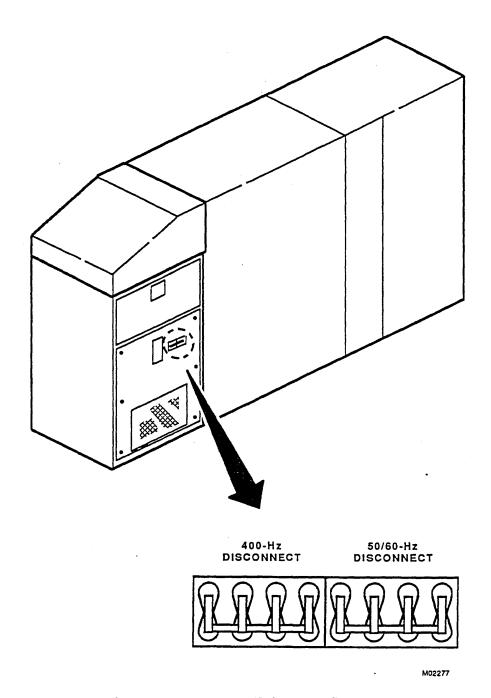


Figure 2-34. Power Unit Rear Controls

 3. Set cir	cuit breakers and controls at front of power unit (figure 2-35) as follows:
a.	Insert key (ships with power unit) in keyswitch on main control panel. Set switch to LOCAL MODE.
b.	NORMAL/DISABLE switch on main control panel to DISABLE.
c.	120V 50/60 Hz CONTROL on AUX. BULK POWER SUPPLY to off (down).
d.	-2.0V POWER SUPPLY DISCONNECT to OFF.
e.	-2.0-V power supply ADJUST to fully ccw position.
f.	-4.5V POWER SUPPLY DISCONNECT to OFF.
g.	-4.5-V power supply ADJUST to fully ccw position.
h.	+5.0V POWER SUPPLY DISCONNECT to OFF.
i.	+5.0-V power supply ADJUST to fully ccw position.

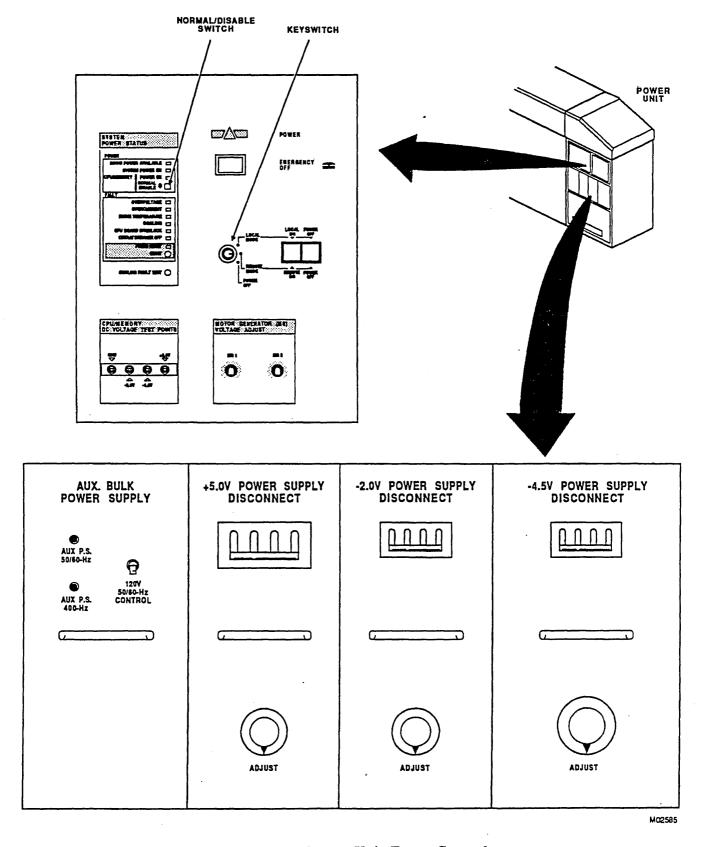
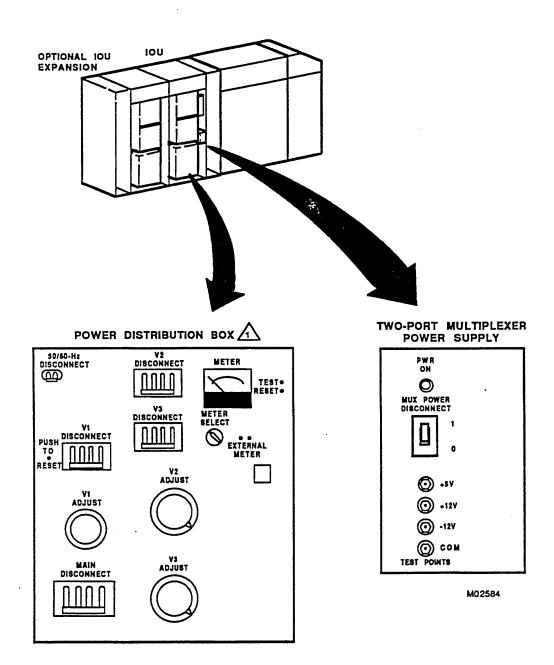


Figure 2-35. Power Unit Front Controls

Installation 2-79

 4. Set IO	U circuit breakers and controls (figure 2-36) as follows:
a.	MAIN DISCONNECT to 0 (OFF).
b.	50/60 Hz DISCONNECT to 0 (OFF).
c.	V1 DISCONNECT to 0 (OFF).
d.	V1 ADJUST to fully ccw position.
e.	V2 DISCONNECT to 0 (OFF).
f.	V2 ADJUST to fully ccw position.
g.	V3 DISCONNECT to 0 (OFF), if present.
h.	V3 ADJUST to fully ccw position, if present.
i.	Mode switch on top of power distribution box to LOC (local).
j.	$MUX\ POWER\ DISCONNECT$ to 0 (OFF). (IOU and optional standalone IOU only.)
 5. Repeat	step 4 for each optional IOU present.
a.	Optional IOU expansion.
b.	Optional standalone IOU.
c.	Optional standalone IOU expansion.



NOTE:

 $\Delta$ 

THIS POWER DISTRIBUTION BOX IS TYPICAL FOR ALL IOUS EXCEPT THE CYBER 960 WHICH DOES NOT HAVE V3.

Figure 2-36. IOU Controls

Checking Prepower Conditions	
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## Connecting Site Power Wiring

The following procedures describe 50/60- and 400-Hz power wiring connections to the IOU, optional IOUs, and power unit.

- Connect Site 50/60- and 400-Hz Power Wiring to IOUs
- Connect Site 50/60- and 400-Hz Power Wiring to Power Unit

#### NOTE

Connections from an under-floor ground reference grid to EMC GND terminals in the following procedures are unnecessary with the normally-used shielded signal cables that go to and from the central computer. For additional information on EMC grounding, refer to EMC Grounding in Chapter 4 of the the Site Preparation General Information manual.

### Connect Site 50/60- and 400-Hz Power Wiring to IOUs

Use this procedure to connect power for the IOU and optional IOUs. Depending on site preparations, power connections to the units are by plug-in power connectors or direct wiring. Direct wiring requires the use of a licensed electrician.

 1. Be sur	re that:
a.	Site 50/60- and 400-Hz power for IOU and optional IOUs is off.
b.	Preinstallation power inspection has been completed and power wiring is correct.
 2. Perfor	m applicable group of substeps:
• Éo	r power cord plug-to-receptacle connections:
a.	Pull preattached 60- and 400-Hz power cords down through IOU and floor cutouts.
b.	Connect power cord plugs to customer-installed 60- and 400-Hz mating receptacles under raised floor.
• Fo	r direct-wire connections, a licensed electrician must:
a.	Remove power input box cover (figure 2-37). Install cover in a later procedure.
b.	Disconnect, remove, and discard 60- and 400-Hz power cords (if present) from power input box TB1 and TB2.
c.	Follow local codes and connect site power wiring to TB1 (50/60 Hz) and TB2 (400 Hz) in power input box. (A Control Data customer engineer must supervise these connections.)
	power label in front of cable cutout for correct identification of unit
a.	Order new label (P/N 18989236) through site parts ordering process.
b.	Mark new label with current voltages.
c.	Replace old label with new label.
 4. Repeat	t this procedure for:
a.	Optional IOU expansion.
b.	Optional standalone IOU.
c.	Optional standalone IOU expansion.

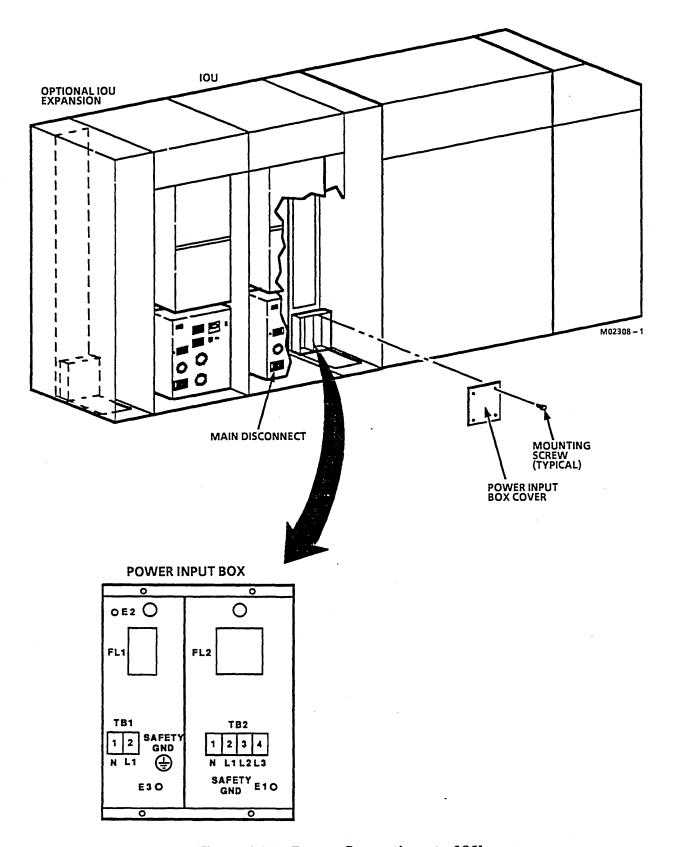


Figure 2-37. Power Connections to IOU

### Connect Site 50/60- and 400-Hz Power Wiring to Power Unit

Use this procedure to connect power to the power unit. Depending on site preparations, power connections to the unit are by plug-in power connectors or direct wiring. Direct wiring requires the use of a licensed electrician.

 1. Be sur	re that:
a.	Site 50/60- and 400-Hz power for power unit is off.
b.	Preinstallation power inspection has been completed and power wiring is correct.
 2. Perfor	m applicable group of substeps:
• Fo	r power cord plug-to-receptacle connections:
a.	Locate power unit power cord plugs and customer-installed 60- and 400-Hz receptacles under raised floor.
b.	Connect power cord plugs to customer-installed 50/60- and 400-Hz mating receptables.
• Fo	r direct-wire connections, a licensed electrician must:
a.	Remove power unit rear airflow control panel, if not previously removed. Install panel in a later procedure.
b.	Remove power input box cover (figure 2-38). Install cover in a later procedure.
c.	Disconnect, remove, and discard 60- and 400-Hz power cords (if present) from power input box TB1 and TB2.
d.	Follow local codes and connect site power wiring to TB1 (50/60 Hz) and TB2 (400 Hz) in power input box. (A Control Data customer engineer must supervise these connections.)
	power label in front of cable cutout for correct identification of unit es. If label is incorrect:
a.	Order new label (P/N 18989236) through site parts ordering process.
b.	Mark new label with current voltages.
c.	Replace old label with new label.

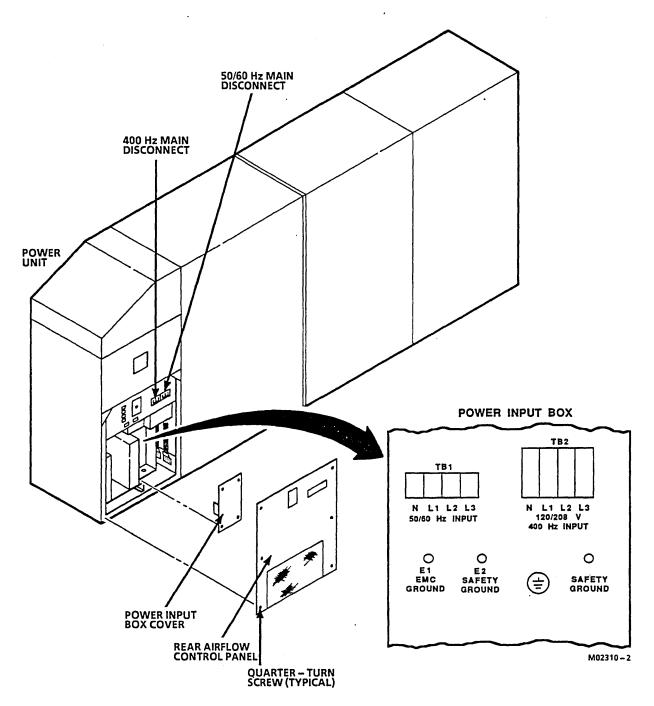


Figure 2-38. Power Connections to Power Unit

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Connecting Site Power Wiring

## Applying Initial Power

The following procedures describe the checks and adjustments necessary to bring the mainframe to an initial state of operation. These procedures assume that all parts of the mainframe are in correct working order. The correction of any problem resulting from a malfunction must be referred to the maintenance manuals listed in the front of this manual.

The application of power requires that 50/60-Hz power be present at the mainframe and MG interface unit as defined in the site preparation manual.

- Check 50/60-Hz Input Voltage to Power Unit
- Check 50/60-Hz Input Voltage to IOU
- Check 400-Hz Input Voltage to Power Unit
- Adjust MG Output Voltage
- Check 400-Hz Input Voltage to IOU
- Check CPU Blower Rotation
- Adjust Power Unit Voltages
- Adjust IOU Voltages
- Adjust Two-Port Multiplexer Power Supply
- Check Power Off and Emergency Off

#### NOTE

The EMERGENCY OFF button on the front of the power unit may be used in an emergency to remove 50/60- and 400-Hz power from the power unit and CPU. When, and only when, the power unit controls the 400-Hz power to the IOUs through the MG interface unit, the EMERGENCY OFF button may also be used to remove 400-Hz power from the IOUs.

# **ACAUTION**

Following the equipment shipment, condensation may form and remain for some time if the equipment moves from a cold to a warm area. Damage may occur if power is applied during this time. To avoid this damage, thoroughly inspect the equipment before applying power to ensure that condensation is not present.

Check 50/60-Hz Input Voltage to Power Unit
Use this procedure to check the 3-phase, 50/60-Hz voltage to the power unit.
1. Be sure that previous procedure is completed.
2. Remove power unit rear airflow control panel (figure 2-39), if not previously removed. Install panel in a later procedure.
<b>▲WARNING</b>
Power input box contains exposed terminals that contain dangerous voltages when site 50/60-Hz or 400-Hz power is on.
3. Remove power input box cover, if not previously removed. Install cover in a later procedure.
4. Set site 50/60-Hz power circuit breaker for power unit to ON.

5. Use voltmeter to check that site 3-phase, 50/60-Hz voltage is present at TB1 between N (neutral) and L1, L2, and L3. Correct any voltage or wiring

problems before continuing.

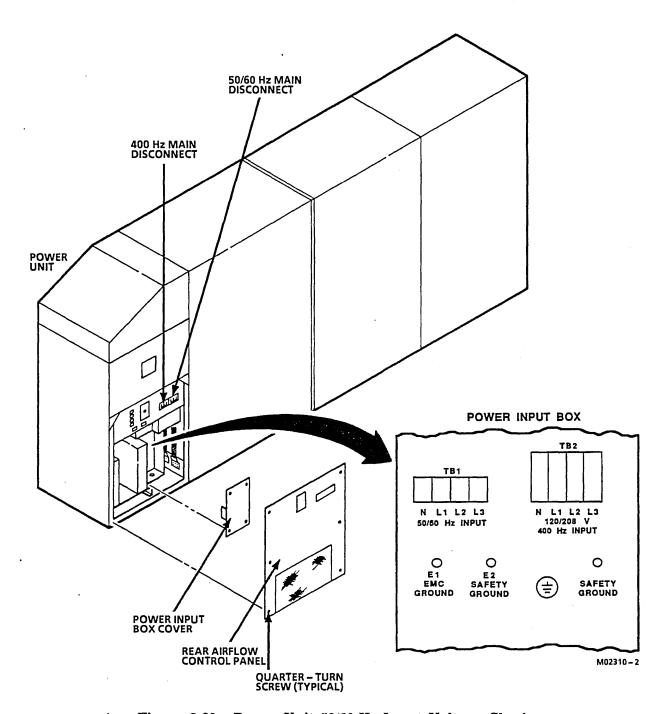


Figure 2-39. Power Unit 50/60-Hz Input Voltage Check

## Check 50/60-Hz Input Voltage to IOU

Use this procedure to check the 1-phase, 50/60-Hz voltage to IOU and optional IOUs.

1. Be sure that previous procedure is completed.

**▲**WARNING

Power input box contains exposed terminals that contain dangerous voltages when site 50/60- or 400-Hz power is on.

 2. Remove IOU power input box cover, if not previously removed. Install cover in a later procedure.
 3. Set site 50/60-Hz power circuit breaker for IOU to ON.
 4. Use voltmeter to check that site 1-phase, 50/60-Hz voltage is present at TB1 between terminals 1 and 2 (figure 2-40). Correct any voltage or wiring problems before continuing.
 5. Repeat this procedure for:
a. Optional IOU expansion.
b. Optional standalone IOU.

\_\_\_ c. Optional standalone IOU expansion

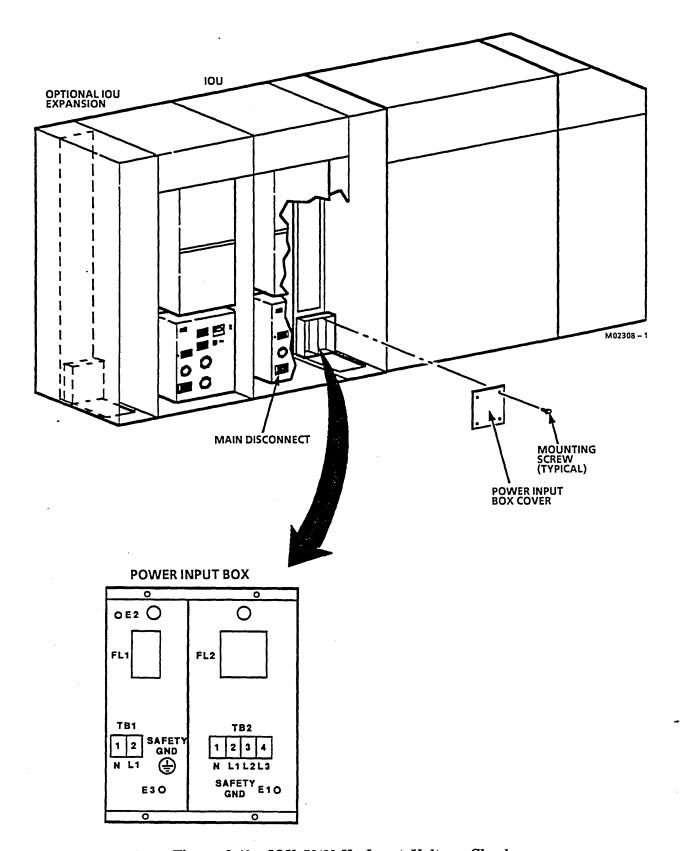


Figure 2-40. IOU 50/60-Hz Input Voltage Check

# Check 400-Hz Input Voltage to Power Unit

Use	th	is procedure to start the MG set and to check the MG voltage at the power unit.		
	_ 1. Be sure that:			
		a. Previous procedure is completed.		
		b. Checkout of the MG interface unit with the MG set was completed during installation of MG interface unit.		
	2.	Set site $50/60\text{-Hz}$ power circuit breakers that control power to MG set and MG interface unit to ON.		
	3.	Check that keyswitch on main control panel on front of power unit is set to LOCAL MODE (figure 2-41)		
	4.	Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel on front of power unit to DISABLE.		
		Power input box contains exposed terminals that contain dangerous voltages when site 50/60- or 400-Hz power is on.		
	5.	Set site 400-Hz circuit breakers for power unit and MG interface unit to ON.		
<del></del>	6.	Set only 50/60 Hz DISCONNECT at rear of power unit to 1 (ON).		
	7.	Press LOCAL ON switch/indicator on front of power unit. Indicator lights and MG starts. MG requires approximately 1 min to obtain full output voltage.		
	8.	Use voltmeter to check 3-phase, 400-Hz voltage is present at power unit power input box at TB1 between N (neutral) and L1, L2, and L3. Nominal voltage is 120 V. A later procedure performs final adjustment of this voltage. Correct any voltage or wiring problems before continuing.		
	9.	Set 50/60 Hz DISCONNECT at rear of power unit to 0 (OFF).		
	10.	Set site circuit breakers that control 400-Hz power to power unit to OFF.		
	11.	Set site circuit breakers that control 50/60-Hz power to power unit and to IOUs to OFF. This causes MG to shut off.		
	12.	Install cover on power input box.		

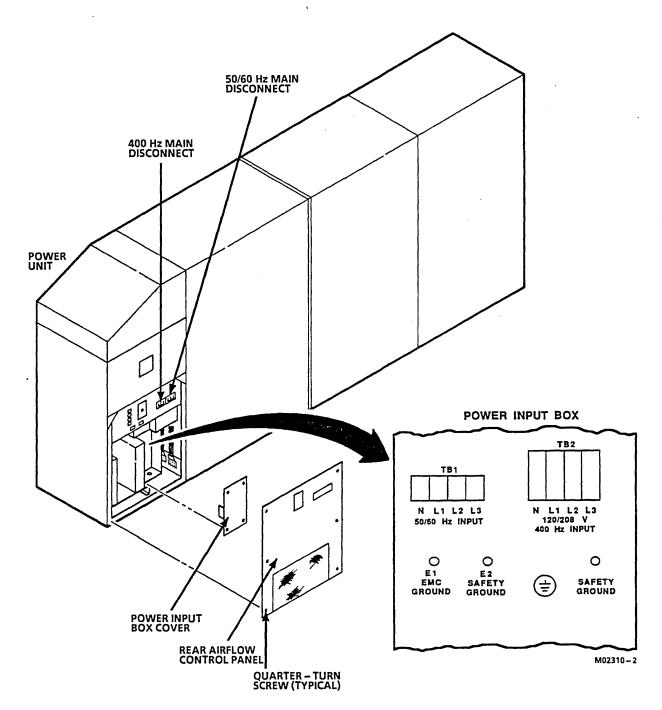
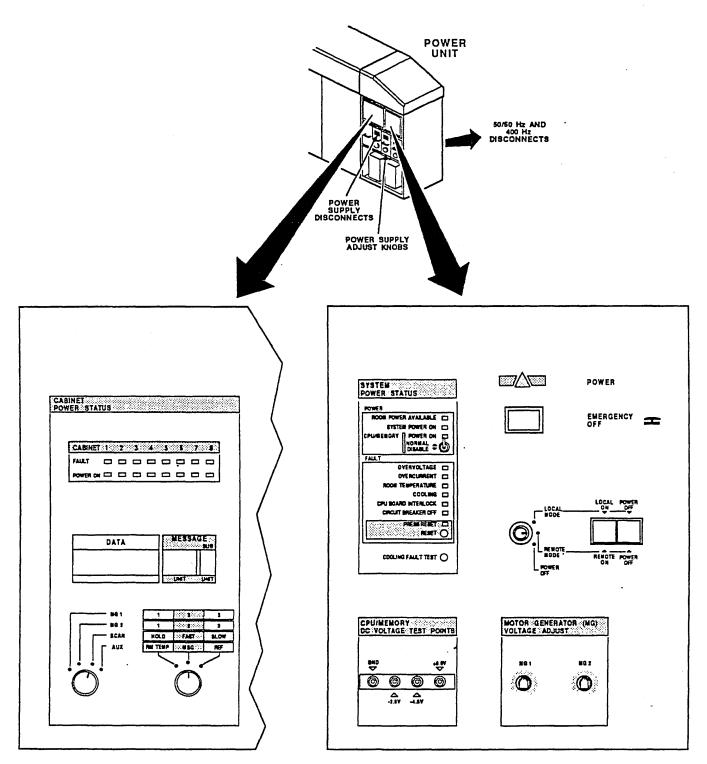


Figure 2-41. Power Unit 400-Hz Input Voltage Check

Revision A

# Adjust MG Output Voltage

Use	th	is procedure to adjust the MG output voltage with controls on the power unit.
	1.	Be sure that previous procedure is completed.
	2.	Set site 50/60-Hz power circuit breakers for power unit and IOUs to ON.
	3.	Set site circuit breaker that controls 400-Hz power to power unit to ON.
	4.	Set 50/60 Hz DISCONNECT at rear of power unit (figure 2-42) to 1 (ON).
	5.	Set 400 Hz DISCONNECT at rear of power unit to 1 (ON).
	6.	Press LOCAL ON switch/indicator on front of power unit. Indicator lights and MG starts. MG requires approximately 1 min to obtain full output voltage.
	7.	Set Selector (left) rotary switch on CABINET POWER STATUS panel to MG 1.
	8.	Set Function (right) rotary switch to 1. DATA display reads MG phase 1 output voltage.
	9.	Turn, if necessary, MG 1 knob on MOTOR GENERATOR (MG) VOLTAGE ADJUST panel to obtain an MG phase 1 output of 120 V.
· ]	10.	Check voltage of MG output phases 2 and 3 in same manner, setting Function (right) rotary switch to display phases 2 and 3. Voltage differences between any two phases should be within $2.1\ V.$
NOT	ГE	
MG	m	ust remain in operation to continue.



M02544

Figure 2-42. MG Set Startup Controls

## Check 400-Hz Input Voltage to IOU

Use this procedure to check the 3-phase, 400-Hz voltage to IOU and optional IOUs.

\_\_\_ 1. Be sure that previous procedure is completed.

# **AWARNING**

Power input box contains exposed terminals that contain dangerous voltages when site 50/60-Hz or 400-Hz power is on.

 2. Set site 400-Hz power circuit breaker for IOU to ON.
 3. Use voltmeter to check 3-phase, 400-Hz voltage is present at power input box TB1 between N (neutral) and L1, L2, and L3 (figure 2-43). Nominal voltage is 120 V.
 4. Repeat steps 2 and 3 for:
a. Optional IOU expansion.
b. Optional standalone IOU.
c. Optional standalone IOU expansion.
 5. Set site 400-Hz power circuit breakers for IOU and optional IOUs to OFF.
 6. Set site 50/60-Hz power circuit breakers for IOU and optional IOUs to OFF.
 7. Install power input box covers on IOU and optional IOUs.
 8. Set site 50/60-Hz power circuit breakers for IOU and optional IOUs to ON.
9 Set site 400-Hz power circuit breakers for IOU and optional IOUs to ON.

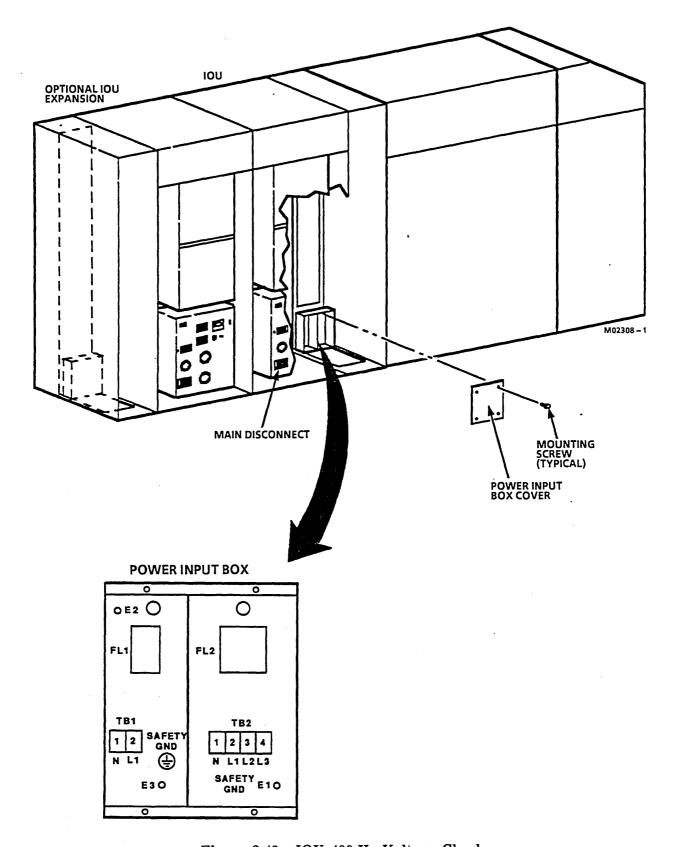


Figure 2-43. IOU 400-Hz Voltage Check

## Check CPU Blower Rotation

	his procese the ro	edure to check for correct CPU blower rotation and, if necessary, to otation.
1	Be sur	e that previous procedure is completed.
2	2. Remov	e rear airflow control panel (figure 2-44), if not previously removed.
3	3. Set 12 on (up	0V 50/60 Hz CONTROL on power unit AUX. BULK POWER SUPPLY to
4	. Set po	wer unit power supply controls as follows.
	a.	+5.0V POWER SUPPLY DISCONNECT to ON.
	b.	-2.0V POWER SUPPLY DISCONNECT to ON.
	c.	-4.5V POWER SUPPLY DISCONNECT to ON.
· 5		that NORMAL/DISABLE switch on SYSTEM POWER STATUS panel is DISABLE.
6	. Press	LOCAL ON switch/indicator on front of power unit.
7	. Press	RESET switch on SYSTEM POWER STATUS panel.
8		DRMAL/DISABLE switch momentarily to NORMAL. This applies atary power to blower, causing it to rotate.
9	must b	re blower through viewing port at rear of power unit. Left-to-right rotation be confirmed by observation.  tion is incorrect:
		Set 50/60 Hz and 400 Hz DISCONNECTs at rear of power unit to 0
	a.	(OFF).
	b.	Reverse jumper plug location at rear of power unit from J10 to J11 or from J11 to J10.
	c.	Set 50/60 Hz and 400 Hz DISCONNECTs to 1 (ON).
	d.	Recheck blower rotation.
10	). Install	front and rear airflow control panels on power unit.

#### CONTROLS ON FRONT OF POWER UNIT

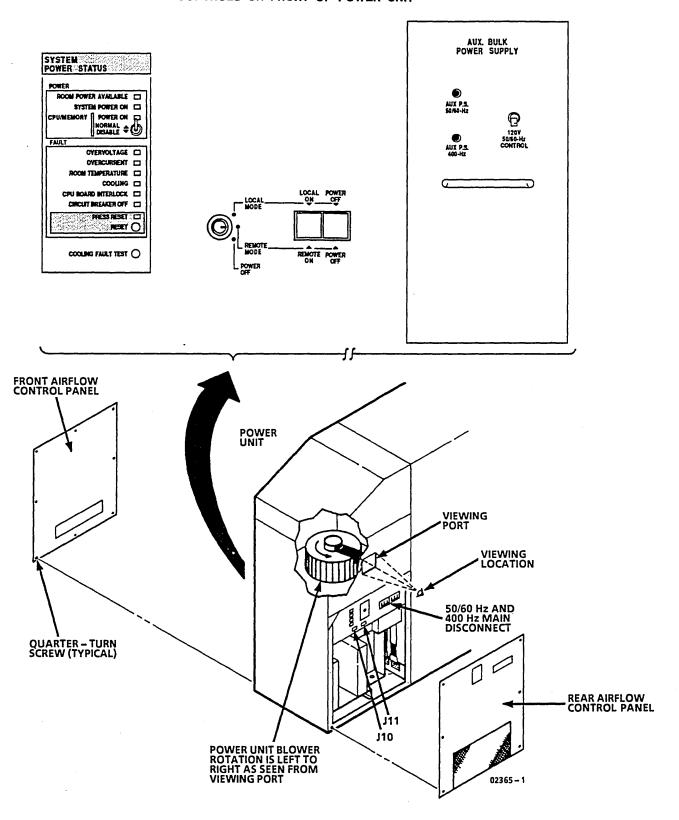
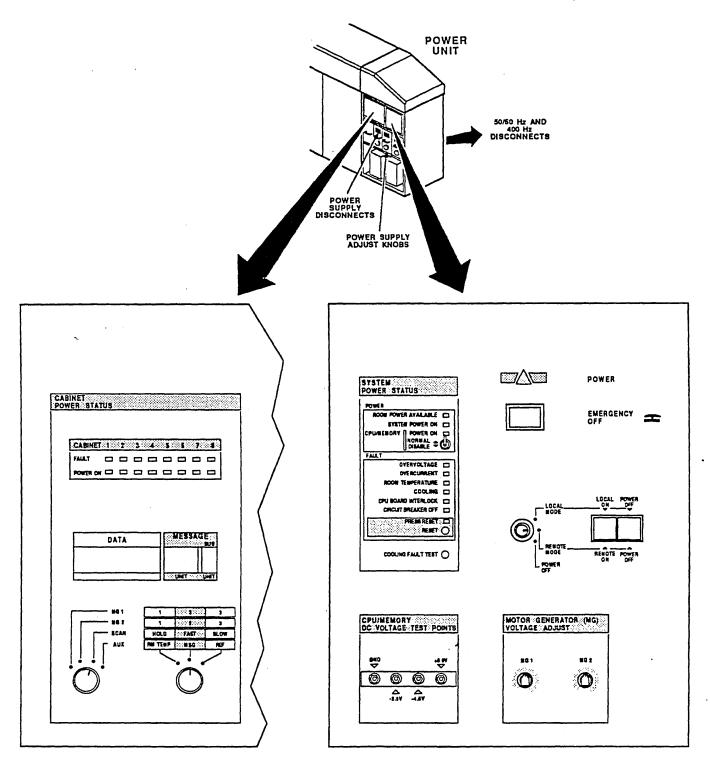


Figure 2-44. CPU Blower Rotation Check

# Adjust Power Unit Voltages

pow	er.
	1. Be sure that previous procedure is completed.
	2. Connect voltmeter between GND and -2.0V test points on control panel (figure 2-45).
	3. Turn $-2.0\text{-V}$ power supply ADJUST knob to obtain a voltmeter reading of $-2.04$ V.
	4. Connect voltmeter between GND and -4.50 V test points.
<del></del>	5. Turn $-4.5\text{-V}$ power supply ADJUST knob to obtain a voltmeter reading of $-4.54$ V.
	6. Connect voltmeter between GND and +5.0 V test points.
	7. Turn +5.0-V power supply ADJUST knob to obtain a voltmeter reading of +5.04 V

Use this procedure to adjust power unit dc voltages during the initial application of

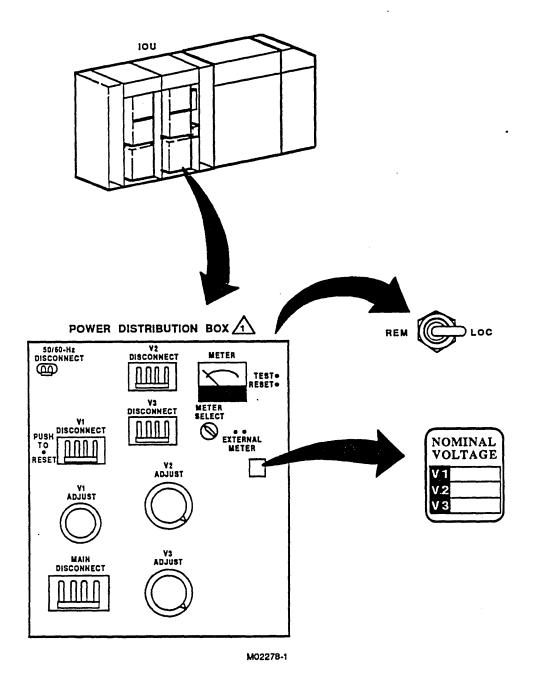


M02544

Figure 2-45. Power Unit Voltage Adjustment Controls

# Adjust IOU Voltages

Use this procedure to adjust IOU dc voltages during the initial application of power to the IOU and optional IOUs.
1. Be sure that procedure to check seating of IOU logic modules is completed.
2. Set 50/60 Hz DISCONNECT on IOU power distribution box to 1 (ON).
3. Apply power sequentially at power distribution box (figure 2-46) as follows:
a. V1 DISCONNECT to 1 (ON).
b. V2 DISCONNECT to 1 (ON).
c. V3 DISCONNECT to 1 (ON), if present.
d. MAIN DISCONNECT to 1 (ON).
e. Press RESET switch.
<b>ACAUTION</b>
IOU blower must be operating to continue.
4. Listen for noise of circulating air to indicate blower operation.

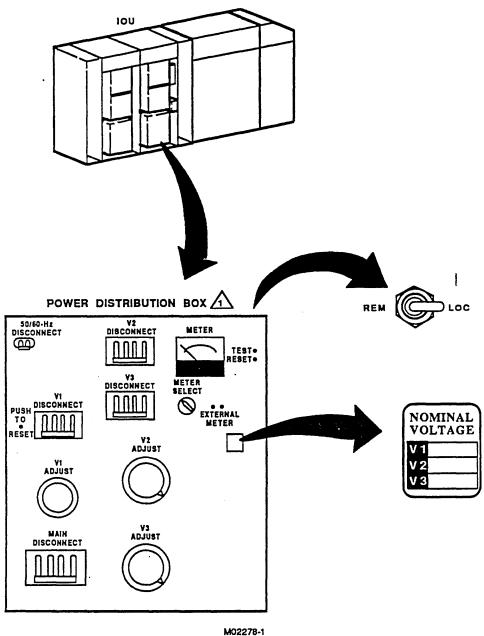


NOTE:

THIS POWER DISTRIBUTION BOX IS TYPICAL FOR ALL IOUS EXCEPT THE CYBER 960 WHICH DOES NOT HAVE V3.

Figure 2-46. IOU Voltage Adjustment Controls

 5. Check	percentage METER mechanical zero (figure 2-47):
a.	Set METER SELECT switch to OFF.
b.	Observe that meter needle rests on left indicator line. If necessary, adjust needle to line with screw on front of meter.
 6. Conne	ct voltmeter to EXTERNAL METER test points.
 7. Adjust	V1 voltage:
a.	Set METER SELECT switch to V1.
b.	Turn V1 ADJUST knob slowly until external voltmeter indicates V1 voltage printed on NOMINAL VOLTAGE label. Percentage meter indicates 0.
 8. Adjust	V2 voltage in the same way as V1.
NOTE	
	m V3 voltage adjustment only after the V1 and V2 adjustments.
 Perfor	
 Perfor 9. Adjust	m V3 voltage adjustment only after the V1 and V2 adjustments.
Perfor  9. Adjust  10. Discon	m V3 voltage adjustment only after the V1 and V2 adjustments.  V3 voltage in the same way as V1, if present.
 Perfor  9. Adjust  10. Discon  11. Set me	W V3 voltage adjustment only after the V1 and V2 adjustments.  V3 voltage in the same way as V1, if present.  nect voltmeter.
 Perfor  9. Adjust  10. Discon  11. Set med  12. Repeat	W V3 voltage adjustment only after the V1 and V2 adjustments.  V3 voltage in the same way as V1, if present.  nect voltmeter.  ode switch to REM (remote).
 Perfor  9. Adjust  10. Discon  11. Set me  12. Repeat	W V3 voltage adjustment only after the V1 and V2 adjustments.  V3 voltage in the same way as V1, if present.  nect voltmeter.  ode switch to REM (remote).  this procedure for:



#### NOTE:

THIS POWER DISTRIBUTION BOX IS TYPICAL FOR ALL IOUS EXCEPT THE CYBER 960 WHICH DOES NOT HAVE V3.

Figure 2-47. IOU Voltage Adjustment Controls

6. Disconnect voltmeter.

### Adjust Two-Port Multiplexer Power Supply

\_ 7. Repeat this procedure for optional standalone IOU.

power supply in the IOU and optional standalone IOU.
1. Be sure that previous procedure is completed.
2. Set MUX POWER DISCONNECT switch on IOU two-port multiplexer power supply to 1 (on), if not previously done. Power supply is accessible from front right side of IOU (figure 2-48).
3. Connect voltmeter between COM and +5V test points.
4. Turn +5V ADJUST on top of power supply with insulated tuning wand to obtain voltmeter reading of +5.10 V.
5. Connect voltmeter between COM and +12V test points and then between COM and -12V test points to ensure +12V and -12V are present.

Use this procedure to turn on and adjust the +5 V of the two-port multiplexer

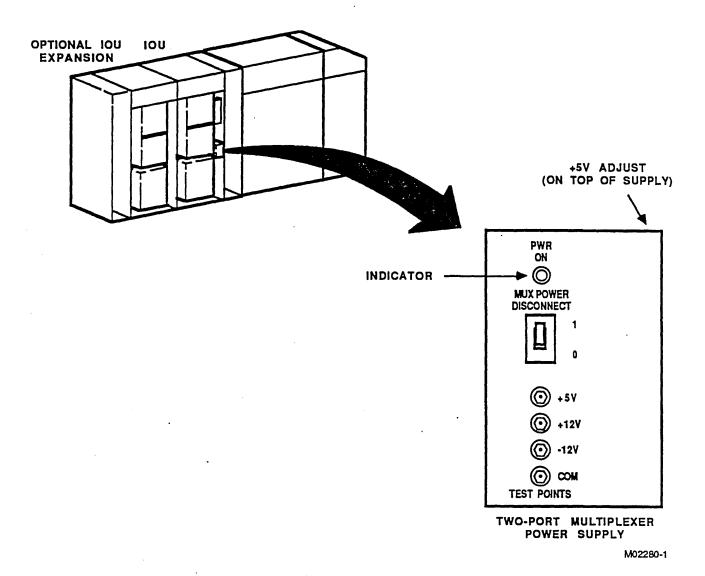


Figure 2-48. Two-Port Multiplexer Power Supply Adjustment

# Check Power Off and Emergency Off

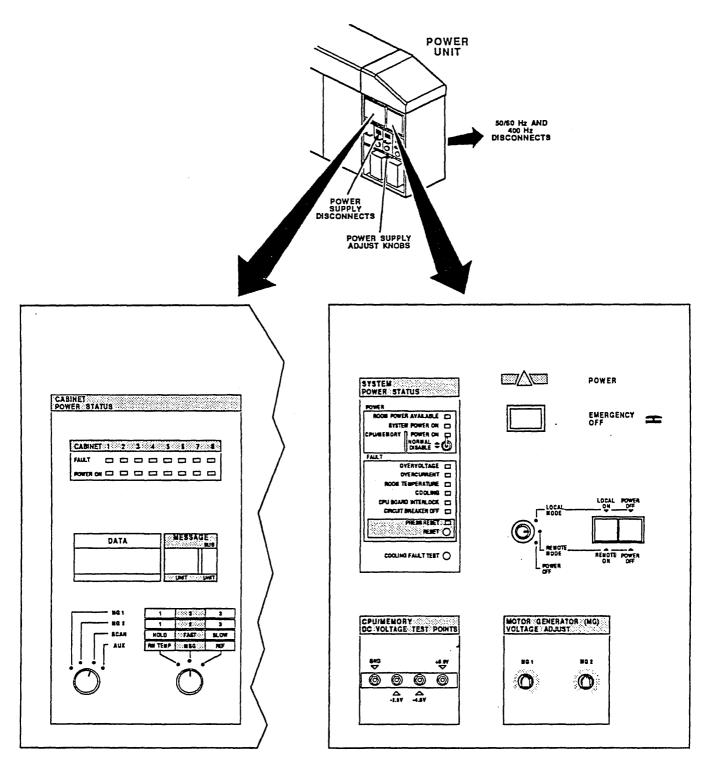
Use this procedure to check the emergency-off and power-off switch functions on the power unit.

\_\_\_ 1. Be sure that all previous procedures are completed.

# **ACAUTION**

The following steps shut off the MG set on two occasions which disrupt the operation of equipment connected to it. Before performing the steps, obtain approval from site personnel.

<u>-</u>	2. Press POWER OFF switch on front of power unit. This shuts off MG set and turns off SYSTEM POWER ON and POWER ON indicators on SYSTEM POWER STATUS panel.
	3. Press LOCAL ON switch on front of power unit. This starts MG set, which requires approximately 1 min to reach full output voltage, and lights SYSTEM POWER ON and POWER ON indicators.
	4. Press EMERGENCY OFF switch on front of power unit (figure 2-49). This causes power unit 50/60 Hz and 400 Hz DISCONNECTS to trip to 0 (OFF).
	5. Begin power-on sequence by setting 50/60 Hz and 400 Hz DISCONNECTS at rear of power unit to 1 (ON). ROOM POWER AVAILABLE indicator on SYSTEM POWER STATUS panel lights.
	6. Check that NORMAL/DISABLE switch on power unit SYSTEM POWER STATUS panel is set to NORMAL.
	7. Press RESET switch on SYSTEM POWER STATUS panel. Indicator labeled PRESS RESET extinguishes.
	8. Press LOCAL ON switch on front of power unit. This causes:
	a. Application of internal 50/60- and 400-Hz power to mainframe units.
	b. SYSTEM POWER ON and POWER ON indicators on SYSTEM POWER STATUS panel to light.



M02544

Figure 2-49. Power ON and Off Controls

Applying Initial Power	
·	*
	<b>15</b> 7

To present the information in this chapter in a structured format, this page has been left blank.

2-112 CYBER 960/962 Mainframe Complex, Installation and Checkout

# Checking IOU Scanning Functions

The following procedures describe checks for the power unit scanning functions for the IOU and optional IOUs.

- Check Scanning of IOU Power Supply Voltages
- Check Scanning of IOU Temperatures

### Check Scanning of IOU Power Supply Voltages

Use this procedure to check IOU voltage scanning and display functions at the power unit CABINET POWER STATUS panel.

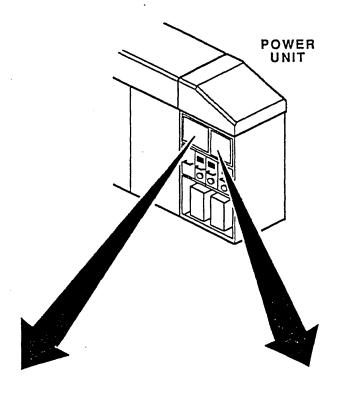
- 1. Be sure that previous procedures are completed.
- 2. Set Selector (left) rotary switch on CABINET POWER STATUS panel to SCAN (figure 2-50).
- 3. Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel to NORMAL.
- 4. Set Function (right) rotary switch to FAST or SLOW:
  - \_\_\_ a. When code C21 appears in MESSAGE display, quickly set Function switch to HOLD. (Scanning stops and IOU power supply voltage V2 appears in DATA display.)
  - \_\_\_ b. Select remaining codes listed in table 2-16 and read their associated power supply voltages for IOU and each optional IOU.

Table 2-16. Scanning Codes for IOU Power Supply Voltages

Unit	Scanning Code <sup>1</sup>	Scanned Voltage <sup>2</sup>
IOU	C21	$-5.20 \pm 0.10 \text{ V}$
•	C22	$-2.20 \pm 0.40 \text{ V}$
	C23	$+5.00 \pm 0.10 \text{ V}$
	C24	$-12.00 \pm 0.60 \text{ V}$
	C25	$+5.00 \pm 0.10 \text{ V}$
	C26	$+12.00 \pm 0.60 \text{ V}$
Optional IOU Expansion	C31	$-5.20 \pm 0.10 \text{ V}$
• • •	C32	$-2.20 \pm 0.40 \text{ V}$
	C33	$+5.00 \pm 0.10 \text{ V}$
Optional Standalone IOU	C41	-5.20 ±0.10 V
•	C42	$-2.20 \pm 0.40 \text{ V}$
	C43	$+5.00 \pm 0.10 \text{ V}$
	C45	$-12.00 \pm 0.60 \text{ V}$
	C46	$+5.00 \pm 0.10 \text{ V}$
	C47	$+12.00 \pm 0.60 \text{ V}$
Optional Standalone IOU	C51	$-5.20 \pm 0.10 \text{ V}$
Expansion	C52	$-2.20 \pm 0.40 \text{ V}$
	C53	$+5.00 \pm 0.10 \text{ V}$

#### Notes:

- 1. Code appears in MESSAGE display on power status panel. Code only appears if unit is present.
- 2. Voltage appears in DATA display on power status panel.



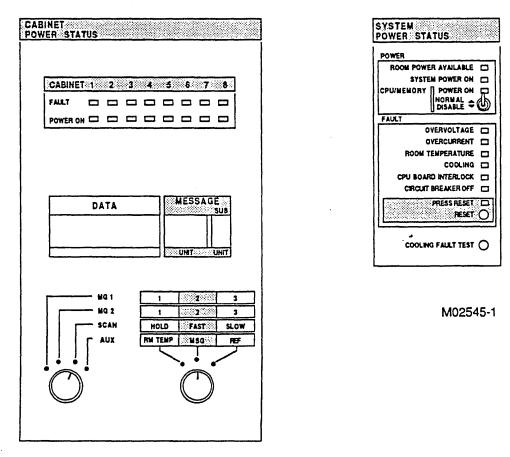


Figure 2-50. IOU Voltage Scanning Controls

#### Check Scanning of IOU Temperatures

Use this procedure to check IOU temperature scanning and display functions at the CABINET POWER STATUS panel.

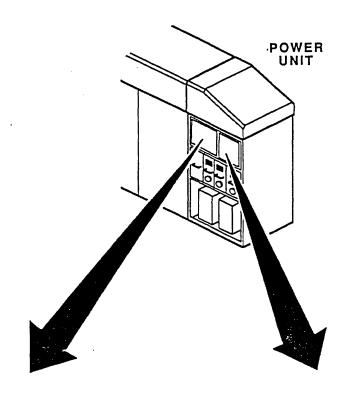
- 1. Set Selector (left) rotary switch on CABINET POWER STATUS panel to SCAN (figure 2-51).
- \_\_\_ 2. Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel to NORMAL.
- \_\_\_\_ 3. Set Function (right) rotary switch to FAST or SLOW:
  - \_\_\_ a. When code HF1 appears in MESSAGE display, quickly set Function switch to HOLD. (Scanning stops and IOU temperature shown in table 2-17 appears in DATA display.)
  - b. Select remaining codes listed in table 2-17 and read their associated temperature displays for IOU and each optional IOU.

Table 2-17. Scanning Codes for IOU Temperatures

Unit	Maximum Outlet Air Temperature 135°F	Maximum Power Heat Sink Temperature 180°F	Maximum Inlet Air Temperature 95°F
IOU	HF1	HF2	HF3
Optional IOU Expansion	EF1	EF2	EF3
Optional Standalone IOU	LF1	LF2	LF3
Optional Standalone IOU Expansion	PF1	PF2	PF3

Note:

Temperatures may vary between IOUs, depending on options installed in the units.



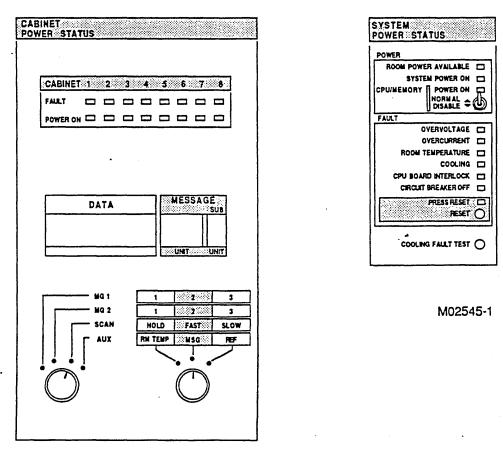


Figure 2-51. IOU Temperature Scanning Controls

## Checking EMI Seals

operation of system.

Use this procedure for final inspection and preparation of the equipment operating electromagnetic interference (EMI) seals. 1. Be sure that previous procedures are completed. 2. Install, but do not close, each removed door as follows: \_\_\_ a. Wear antistatic smock and wrist strap. \_\_\_\_ b. Move door or panel near to installation location. \_\_\_ c. Hold door or panel with one hand and connect ground wire from wrist strap to equipment frame ground with other hand. \_\_\_ d. Install door or panel on equipment. 3. Open all doors and inspect copper fingers (figure 2-52). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between door and unit. (Replacement copper fingers are supplied with equipment.) 4. Inspect all door closures to ensure that copper fingers compress against unit frames. Adjust door cam latches as necessary to correct any loosely fitting doors. 5. Close all doors and completely rotate door cams cw for checkout and normal

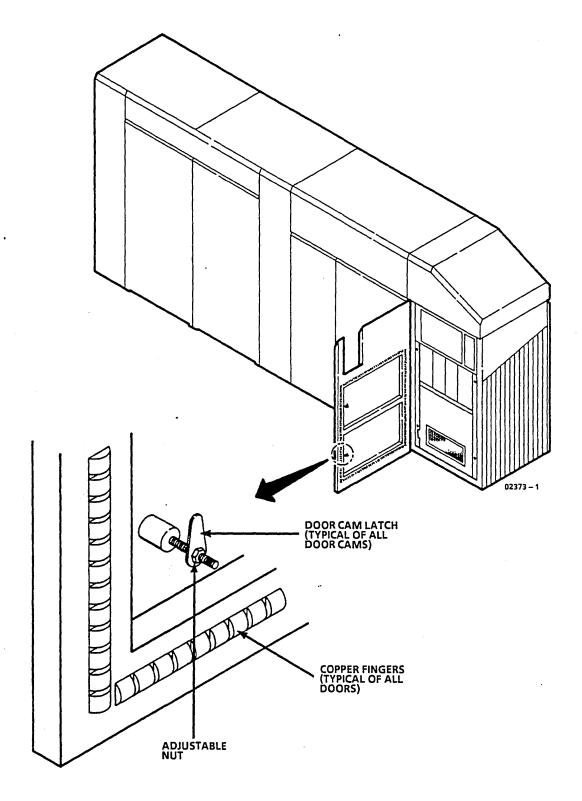


Figure 2-52. Typical EMI Door Seals

## Installing System Console Cabling

Use this procedure to connect signal cabling from the system console to the IOU, optional standalone IOU, and power unit.

For additional installation and operation information of the system console, refer to the System Console Operations/Maintenance manual packaged with the system console.

 1. Be sur	e that site 50/60-Hz power for the system console power is off.
 2. Connec	et cables as follows:
a.	Locate cables shipped in IOUs and power unit.
b.	Locate power unit-to-system console cable, removed from shipping location in power unit in a previous procedure.
c.	Place system console cables under raised floor and through floor and unit cutouts as shown in figure 2-53.

Table 2-18. System Console Cable Connections

System Console Rear Connector	IOU/Power Unit Connector	Cable P/N, Length
8	IOU TERMINAL.01	19268593, 15.2 m (50 ft)
6	IOU TERMINAL 1 <sup>1,2</sup>	19268593, 15.2 m (50 ft)
7	Standalone IOU TERMINAL 01	52537802, 15.2 m (50 ft)
3	Power unit connector J3 <sup>3</sup>	67185786, 15.2 m (50 ft)

#### Notes:

- 1. Cable ships preconnected to this connector.
- 2. Do not use TERMINAL 1 on optional standalone IOU.
- 3. Cable ships in lower part of power unit.

\_\_\_ d. Connect cables as listed in table 2-18.

\_\_\_ 3. Install end panel on power unit.

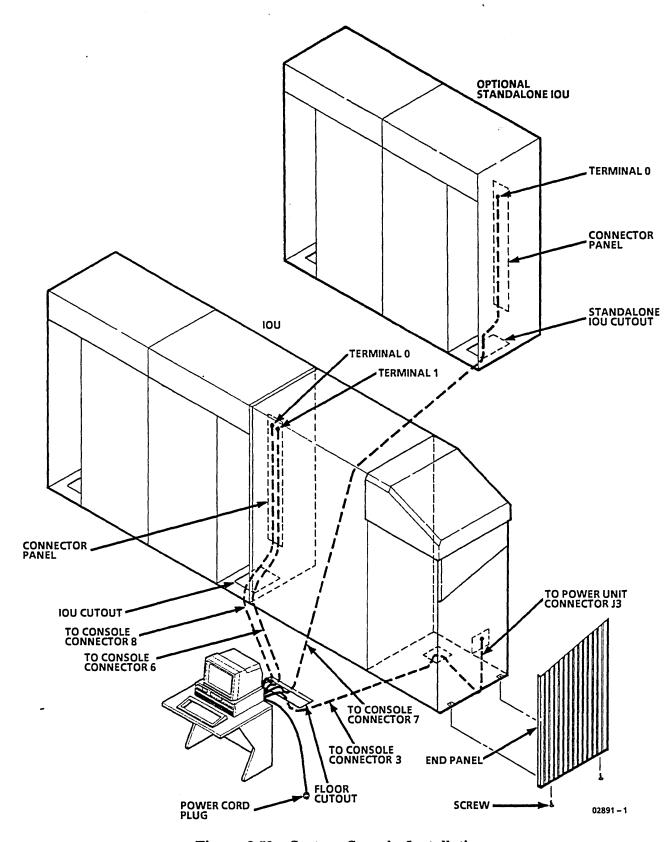


Figure 2-53. System Console Installation

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Checkout	<u>3</u>
Installing CIP	. 3-2
Running Diagnostics	. 3-3
Test AT478-B (IOU 0) and Optional AT481-B (IOU 1)	
Test AT511-A (IOU 0) and Optional AT512-A (IOU 1)	. 3-5
Test Optional Standalone AT511-A (IOU 2) and AT512-A (IOU 3)	. 3-6
Run CP-0 Quicklook Tests	. 3-7
Run CP-1 Quicklook Tests	3-8
Running Network Operating System Validation Suite	. 3-9
Checking Electromagnetic Compatibility	3-10
Checking Electromagnetic Compatibility  Installing and Testing RTA Equipment	3-11

 This chapter uses the following procedures to establish a confidence level that the central computer can run the operating system.

- Installing CIP
- Running Diagnostics
- Running Network Operation System Validation Suite
- Checking Electromagnetic Compatibility
- Installing and Testing RTA Equipment

Should any problems arise during the checkout that cause excessive delays that are not readily resolvable through normal checkout practices or through the use of maintenance manuals, call your CYBER Hardware Support (CHS) for sites in the U.S.A. or your Technical Support office for international sites.

# Installing CIP

Use this procedure to install the CYBER Initialization Package (CIP).

 1. Locate following manuals for reference. Some manuals are for later procedures. All manuals are shipped with the equipment.
a. CYBER Initialization Package Reference Manual
b. 19003 System Console Operations/Maintenance Manual
c. MSL 15X Off-Line Maintenance Software Library Reference Manual
d. CYBER 96X MSL Test Procedures Reference Manual
e. MSL 153/155 Maintenance Software Reference Manual Test Procedures
f. MSL 153/155 Maintenance Software Reference Manual Test Descriptions
2. Locate CIP tape. Your famaliarization with the tape and a capability to set tes parameters and modify command buffers are necessary. The tape ships with system and includes:
• Common Test and Initialization (CTI)
Dedicated Fault Tolerance (DFT)
• Environmental Interface (EI)
Maintenance Software Library (MSL)
• Microcode
 3. Be sure to:
a. Read all bulletins, software releases, and special instructions supplied with the CIP Reference manual.
b. Check that all installation procedures are completed and all unit doors are shut and latched.
c. Check that system peripheral equipment is installed and operating.
 4. Perform Power-on Initialization procedure for system console. (Refer to instructions in System Console Operations/Maintenance manual.)
 5. Install CIP tape. (Refer to detailed instructions in CIP Reference manual.)
 6. Deadstart from CIP disk. Refer to CIP Reference manual.

## Running Diagnostics

Use the following procedures to run diagnostic tests under normal conditions without voltage and clock margins. The procedures require selections that depend upon the IOU and CPU configurations.

To select the applicable procedures, you need to know if the system includes the AT478-B IOU or the AT511-A IOU and which of the optional AT481-B IOU expansion, AT512-A IOU expansion, AT511-A standalone IOU, and AT512-A standalone IOU expansion units are present.

## The procedures are:

- Test AT478-B (IOU 0) and Optional AT481-B (IOU 1)
- Test AT511-A (IOU 0) and Optional AT512-A (IOU 1)
- Test Optional Standalone AT511-A (IOU 2) and AT512-A (IOU 3)

You will also need to know if the CPU includes a single processor or a dual processor.

- Run CP-0 Quicklook Tests
- Run CP-1 Quicklook Tests

## Test AT478-B (IOU 0) and Optional AT481-B (IOU 1)

Run IOU diagnostic tests listed in table 3-1. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following IOU manuals:

- MSL 153/155 Maintenance Software Reference Manual Test Procedures
- MSL 153/155 Maintenance Software Reference Manual Test Descriptions

Table 3-1. IOU Tests for AT478-B (IOU 0) and Optional AT481-B (IOU 1)

Test	CMD Buffer Name	Number of Passes (Decimal)	Test Complete (X)	Comments
QLT4 EXT4 PMT4 PMU4 CHD4 CMA4 MRA4 MRT4	FII40	1 1 1 1 1 1 1	() () () () () () ()	
ISI4	ISI4xx	1	( )	
HYDR UHYD	HYDRzyy UHYD	1 1	()	
CCA4	CCA4xx	1	()	
IPI4	IPI4xx	1	()	

## Test AT511-A (IOU 0) and Optional AT512-A (IOU 1)

Run IOU diagnostic tests listed in table 3-2. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following IOU manuals:

- MSL 153/155 Maintenance Software Reference Manual Test Procedures
- MSL 153/155 Maintenance Software Reference Manual Test Descriptions

Table 3-2. IOU Tests for AT511-A (IOU 0) and Optional AT512-A (IOU 1)

Test	CMD Buffer Name	Number of Passes (Decimal)	Test Complete (X)	Comments
QLT44 EXT44		1 1	.( )	
PMT44 PMU44 CHD44	FII44	1 1 1	()	
CMA44 MRA44 MRT44		1 1 1	() () ()	
ISI44	ISI44xx	1	()	
HYDR4 UHYD4	HYDR4zy UHYD4	1 1	()	
CCA44	CCA44xx	1	()	
IPI44	IPI44xx	1	()	

# Test Optional Standalone AT511-A (IOU 2) and AT512-A (IOU 3)

NOTE

These tests will be available in a later manual revision.

## Run CP-0 Quicklook Tests

Run the CP-0 model-independent quicklook tests listed in table 3-3. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following CPU manual:

CYBER 96X MSL Test Procedures Reference Manual

Table 3-3. CP-0 Quicklook Tests

Test <sup>1</sup>	CMD Buffer Name	Number of Passes (Decimal)	Test Complete (X)	Comments
TRAP3	1	1	( )	
FCT93		1	( )	
EXCH3		1	( )	
$EXC3^2$	INSTALL		( )	
RCT13		25	( )	
RCT23		200	( )	
SNGL3		25	( )	
CRPT3		25	( )	
СМЕМ3		1	( )	Section 11 only

## Notes:

- 1. If quicklook tests are run individually, some manual inputs to screen prompts may be required and the system must be initialized if not previously done. For additional instructions, refer to the MSL 15X Maintenance Software Reference manual.
- 2. EXC3 runs at least 100 passes of CT8 and at least one pass each of CU8, MY1, and FS8.

## Run CP-1 Quicklook Tests

Run the CP-1 model-independent quicklook tests listed in table 3-4. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following CPU manual:

• CYBER 96x MSL Test Procedures Reference Manual

Table 3-4. CP-1 Quicklook Tests

Test <sup>1</sup>	Number of Passes (Decimal)	INSTALL Test Complete (X)	INSTALB Test Complete (X)	Comments
TRAP3	1	( )	()	
RCT13	25	( )	( )	
RCT23	200	( )	()	
SNGL3	25	()	()	
CRPT3	25	( )	( )	
CMEM3	1	( )	()	Section 11 only

## Notes:

- 1. If quicklook tests are run individually, some manual inputs to screen prompts may be required and the system must be initialized if not previously done. For additional instructions, refer to the MSL 15X Maintenance Software Reference manual.
- 2. EXC3 runs at least 100 passes of CT8 and at least one pass each of CU8, MY1, and FS8.

## Running Network Operating System Validation Suite

Refer to the NOS and NOS/VE System Validation Suite (SVS) User's manual to test CYBER 960 and 962 mainframe hardware features in a NOS or NOS/VE operating system environment. An Engineering Services field representative provides the site with the SVS User's manual and the SVS tape.

## Checking Electromagnetic Compatibility

Use this check to determine reference points, using a voltage-level noise generator, for future reference.

## NOTE

This check must be performed. It is not optional but may be performed at a time that is convenient to the site schedule to avoid causing noise problems to other systems in the computer room.

Refer to CAMS II MIF tape, and perform GRND procedures to test the electromagnetic compatibility (EMC) of the central computer.

# Installing and Testing RTA Equipment

Use this procedure to install and verify the operation of the RTA equipment, except where RTA via data line is not allowed by the customer.

Should any problems arise during this installation and verification, call CYBER Hardware Support (CHS) for sites in the U.S.A. or your Technical Support office for international sites.

 . Refer to Remote Technical Assistance Handbook to install RTA.
 Verify remote data-link operation within 48 hours after completion of comput system installation by:
a. Notifying CHS 24 hours in advance of verification.
b. Calling and establishing an RTA data link with CHS.

-

# Appendixes

СP	Regulator Pak Installation	A-1
СP	Module Installation	
Glo	essary	

# CP Regulator Pak Installation

A

Use this procedure to install the CP regulator pak when the pak is not installed in the CP before shipment to the site.

# **ACAUTION**

Antistatic measures must be followed during the installation of the CP regulator pak to prevent damage to the pak by electrostatic discharges.

	1. Wear antistatic smock.
	2. Attach antistatic wrist strap to wrist and frame ground.
<u></u>	3. Remove regulator pak from antistatic bag.
	4. Place pak on channel guide (figure A-1) at bottom of CP-0 logic cage. Slide pak into cage, through a springy resistance, until it seats in rear connectors.
	5. Install regulator pak retaining screw.
	6. Connect J1 and J3 to front of regulator pak.
	7. Repeat this procedure for optional CP-1 logic cage.

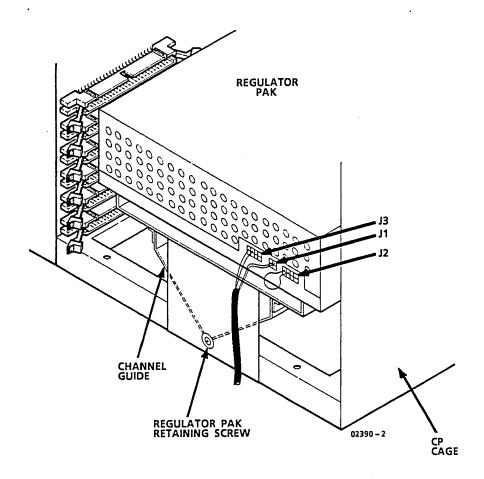


Figure A-1. CP Regulator Pak

• • • 

Use this procedure to install logic modules in CP-0 and optional CP-1 when the modules are not installed in the CP before shipment to the site.

CP Module Installation B-1

 1. Lo	cate	special	module	tools	in	in stall at ion	kit	which	ships	with	power	unit:
•	Pin	alignm	ent gau	ge								

Pin straightenerQuick release

•	<b>Quick</b>	release

<b>A</b> CAU7	ΓΙΟΝ
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Antistatic measures must be followed during the installation of the CP logic modules to prevent damage to the modules by electrostatic discharges.

 2. Wear antistatic smock.	
 3. Attach antistatic wrist strap to wrist and frame ground.	

# **ACAUTION**

Use only the quick release intended for the cams. Other quick releases or devices will cause damage.

 4. Pull out all cams from cage, using quick release.
 5. Remove CMCA logic module from shipping container.
 6. Remove CMCA module from antistatic bag. Lay bag on flat surface (table or floor) and lay module on bag.
 7. Remove connector covers from module.
 8. Check for bent or broken connector pins by placing alignment gauge over pins (figure B-1). Use pin straightener to straighten pins as necessary.

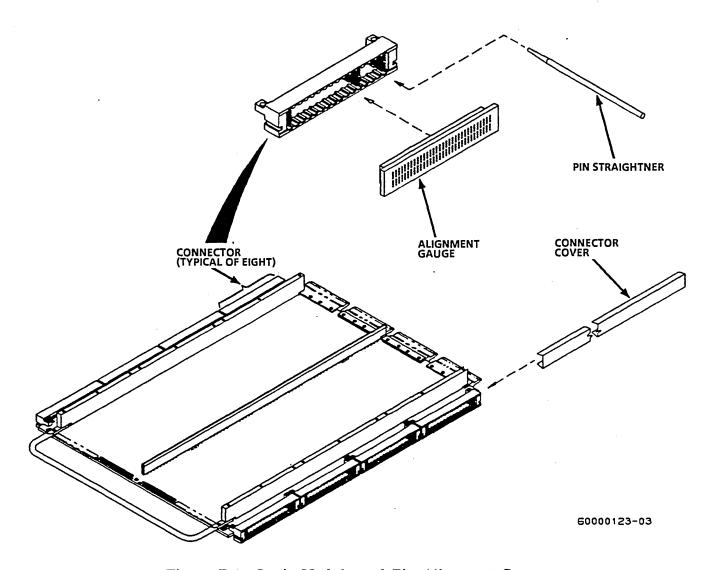
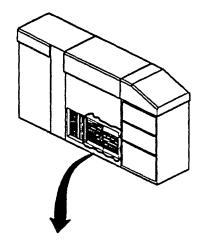


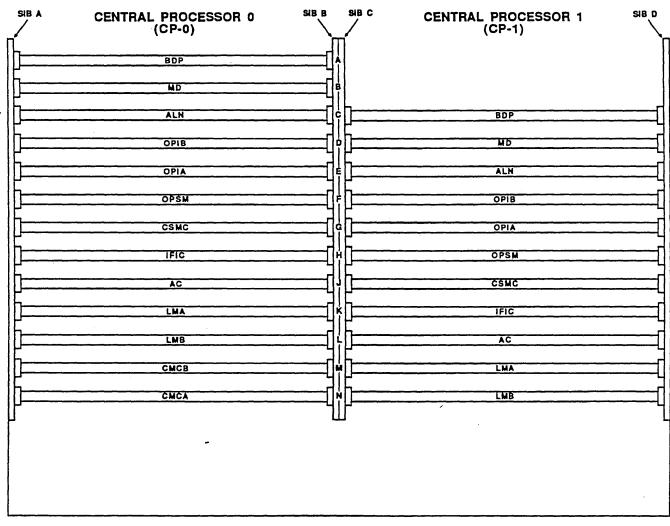
Figure B-1. Logic Module and Pin Alignment Gauge

		ssociated			CP ca	ıge (f	igure	B-2)	and	check	that	quick	
10.	Center e	edge of m	odule in	slot.									
	<b>♠</b> C/	UTIO	N	-	<del></del> ,			<u> </u>					<del></del>
	When p	ushing m	odule in	to its sl	ot, ob	serve	the u	ınders	side	of the	modi	ıle to	be

\_\_\_\_11. Push module slowly into slot, through a springy resistance, until module seats in rear connectors with an audible thud.

sure that any wires on the underside do not catch on anything below.





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Figure B-2. CP Logic Module Locations

AC	CAUTION								
	Do not force cam in. If cam binds or does not move relatively freely, pull cam out, and push in again.								
	n still binds, fully pull out both cams, remove module, check for and ct any bent or broken pins, reseat module, and push cams in again.								
	e board interlock out of right cam bracket and momentarily hold inte pushing cam fully into cage.								
	ll remaining CP-0 modules in same manner as CMCA module, workin bottom to top of cage as follows.								
	a. CMCA b. CMCB c. LMB d. LMA e. AC f. IFIC g. CSMC h. OPSM i. OPIA j. OPIB k. ALN l. MD m. BDP								
	ll CP-1 modules in same manner as CMCA module, working from bot of cage as follows.								
	a. LMB b. LMA c. AC d. IFIC e. CSMC f. OPSM g. OPIA h. OPIB i. ALN j. MD k. BDP								

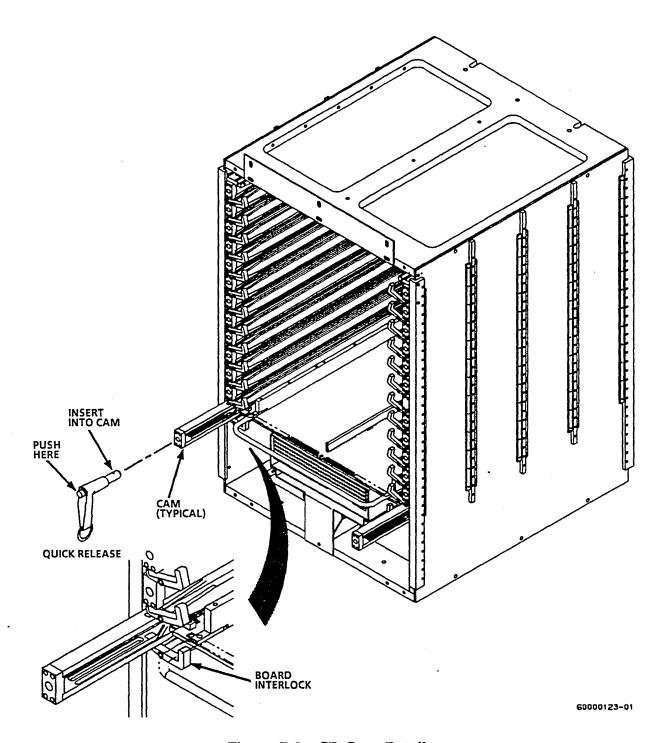


Figure B-3. CP Cage Details

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# Glossary

 ${f C}$ 

 $\mathbf{C}$ 

## **CCW**

Counterclockwise.

## Central Memory (CM)

The main memory of the CYBER 960/962 within the central processing unit cabinet. CM stores between 64 and 256 megabytes of data on 4 to 16 memory modules. CM hardware includes memory modules, a dedicated logic cage, a memory interface module, and voltage regulator modules.

## Central Memory Control (CMC)

The logic element in the CPU that controls the movement of data between central memory (CMCA and CMCB) and the central processor. The CMC circuits reside on two logic modules located in the CP-0 logic cage, but accomplish memory control for both CP-0 and CP-1.

## Central Processing Unit (CPU)

The main processing cabinet in the CYBER 960 Series mainframe, which includes the central processor (CP-0 and CP-1), central memory control, and central memory. The CPU cabinet has up to two central processors and between 64 and 256 megabytes of resident memory.

## Central Processor (CP)

The functional processing logic within the CYBER 960/962 CPU. The first (or standard) central processor is referred to as CP-0. If a second central processor is provided with a system, it is referred to as CP-1. Each central processor resides in a separate logic cage and consists of eleven logic modules.

## CHS

CYBER Hardware Support.

## CIO

See Concurrent Input/Output.

#### CIP

CYBER Initialization Package.

## CM

See Central Memory.

#### **CMC**

See Central Memory Control.

## **CMD**

Command.

#### **CMSE**

Common maintenance software executive.

D

## Computer room

A room that has a controlled environment that is maintained to meet the requirements of the system equipment.

## Concurrent Input/Output (CIO)

An input/output unit architecture that functions with the NOS/VE operating system.

## CP-0

See Central Processor. See also Central Processing Unit.

#### CP-1

See Central Processor. See also Central Processing Unit.

#### CPU

See Central Processing Unit.

## CTI

Common test and initialization.

## CW

Clockwise.

## CYBER 960 Series (960/962) Computer Systems

Includes CYBER 960 and CYBER 962 computer systems. The CYBER 960 Series is Control Data's state-of-the-art middle- to high-range system, flanked by the 930 departmental computer on the low end and the 990 computer on the high end of the scalar performance spectrum. A full 960 system includes the mainframe (CPU, IOU, and power unit), MG set, system console, operating software, and a complement of peripherals.

#### D

#### DFT

Dedicated fault tolerance.

## **Dual Processor**

See Central Processor.

## $\mathbf{E}$

## ΕI

Environmental interface.

#### **EMC**

Electromagnetic compatibility.

## Emergency Power Shutdown

A shutdown of part or all of system logic power occurs automatically upon expiration of a LW (1 minute for fault in IOUs; 2 minutes for fault in power unit, CPU cabinet, or for high ambient room temperature) or SW (2.5 seconds) if the fault still exists.

## **EMI**

Electromagnetic interference. Synonomous with Radio Frequency Interference.

## EXP

Expansion.

 $\mathbf{F}$ 

#### FCC

Federal Communication Compliance.

#### FCO

Field change order.

## Frequency converter

A motor generator mounted within its control cabinet.

H

#### Hdr

Header.

## Hertz (Hz)

A measure of frequency or band width the same as cycles per second.

Hz

See Hertz.

I

## Immediate Emergency Power Shutdown

An immediate shutdown of power without warning occurs automatically for faults that would damage equipment if they were to continue.

## Input/Output Unit (IOU)

IOU contains the peripheral processors and channels that enable operator interaction with, and peripherals access to, the central processing unit. The IOU has either NOS and NOS/VE capability (CYBER 960) or is NOS/VE only (CYBER 962). The IOU has the interface port for the system console.

#### IOU

See Input/Output Unit.

## IOU Expansion

An add-on IOU product that physically attaches to the CYBER 960 IOU. The IOU expansion is a concurrent input/output (CIO) architecture and allows for addition of up to ten peripheral processors and ten channels. The IOU expansion is the first IOU option to be added to a CYBER 960 mainframe, increasing the number of IOU cabinets to two.

D

#### IPI

Intelligent peripheral interface channel architecture in the IOU.

#### ISI

Intelligent standard interface channel architecture in the IOU.

## $\mathbf{L}$

#### LDS

Literature Distribution Services.

## LOC

Local.

## Logic Cage

Hardware structure in mainframe central processing unit, input/output unit, or power unit that houses logic as memory modules or power boards.

## Logic Module

A printed-circuit board with microcircuit chips.

## Long Warning (LW)

The power unit generates an LW when an emergency power shutdown is to occur in approximately 1 minute if the fault is in an IOU or in approximately 2 minutes if the fault is in the power unit, CPU cabinet, or with ambient room temperature (assuming the detected fault continues).

### M

### Mainframe

Includes the central processing unit, input/output unit, and power unit portions of the mainframe complex. The mainframe does not include the motor-generator set or the system console.

## Mainframe Complex

The hardware products that make up a central processing computer system are referred to collectively as the mainframe complex. Includes the central processing unit, input/output unit, power unit, system console, and the motor-generator set. Peripherals are not included in the mainframe complex.

## Motor-Generator (MG) Interface Unit

The electrical box that interfaces with the motor-generator set. Also see Motor-Generator (MG) Set.

## Motor-Generator (MG) Set

A motor generator and a separate motor-generator control cabinet that converts 3-phase site utility power to 3-phase, 400-Hz power suitable for the mainframe electrical requirements. Smaller MG sets may include the MG and its MG control functions within one cabinet and be referred to as a frequency converter.

#### MSL

Maintenance software library.

#### 1

## Multiplexer (MUX)

Equipment that enables a site to concentrate data transmission between multiple slower-speed devices (such as, terminals and workstations) and a higher-speed channel. For example a multiplexer can concentrate data being transmitted between multiple terminals and an host computer by using a local area network.

## MUX

See Multiplexer.

## MUX BD

Multiplexer board.

### N

## Network Operating System (NOS)

An operating system for the host computer. It has network capabilities for time-sharing and transmission processing in addition to local and remote batch processing. NOS controls the computation of programs submitted through remote terminals and maintains normal batch processing operations for jobs submitted locally.

## Network Operating System/Virtual Environment (NOS/VE)

An operating system for the host computer. It has network capabilities for time-sharing and transmission processing in addition to local and remote batch processing. NOS/VE operates in Virtual State and controls the computation of programs submitted through remote terminals and maintains normal batch processing operations for jobs submitted locally.

#### NOS

See Network Operating System.

## NOS/VE

See Network Operating System/Virtual Environment.

## 0

## Optl

Optional.

## P

## P/N

Part number.

## Peripheral equipment

Those devices in a system that are distinct from the mainframe and provide secondary storage or input/output functions.

### Power unit

Provides power to support the electrical systems (logic, environmental, and so on) of the CPU. (The IOU has its own power supply.) The power unit occupies a cabinet that attaches to the CPU.

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z

#### PP

Peripheral processor.

## R

## Radio Frequency Interference (RFI)

Electrical noise signals that may cause health hazard and/or operational hazards to equipment.

## **RTA**

Remote technical assistance.

#### RTA Modem

(ISO) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities. Modem is a contraction of modulator-demodulator.

## $\mathbf{S}$

iensu: e

## Short Warning (SW)

The power unit generates on SW when an emergency power shutdown is to occur in 2.5 seconds. Also see Emergency Power Shutdown.

#### SIB

See Side Interconnect Board.

## Side Interconnect Board (SIB)

SIBs are the printed-circuit boards that interconnect the central processor logic modules. The multilayered SIBs actually constitute the sides of the CP logic cages. CP-0 logic modules are interconnected with SIB A and SIB B, while CP-1 logic modules are interconnected with SIB C and SIB D.

## Single processor

See Central Processor.

## Site

The computer room and other building locations that may include one or more motor-generator sets and data media storage.

#### SPCP

System power control panel.

#### Standalone IOU

The standalone IOU is an option that provides the CYBER 960/962 mainframe with a dual IOU configuration. The standalone IOU is installed on an island separate from the mainframe, but is linked to the CYBER 960/962 CPU with 50-ft cables. Up to ten peripheral processors (PPs) and ten channels reside in the standalone IOU cabinet.



## ( ()

## Standalone IOU Expansion

A standalone IOU expansion product can be added to the standalone IOU, doubling the PP and channel capability of the standalone IOU configuration. The standalone IOU expansion and the IOU expansion differ only in their physical location relative to the mainframe.

## **SVS**

System Validation Suite.

## System Console

The keyboard and display screen used to monitor and control the operating system.

## V

V

1. Valid bit. 2. Also see Volt.

## Volt (V)

A measure of the work needed to move an electric charge.

1

## 170 DMA

CYBER 170 direct-memory access interface channel architecture in the IOU.

